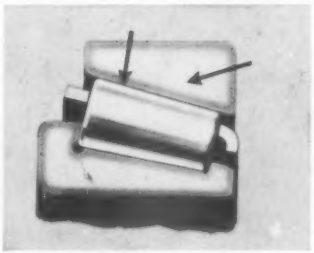
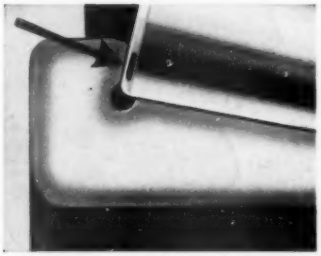
the OIL AND GAS JOURNAL

6 good reasons for specifying TIMKEN® tapered roller bearings

26 TYPES. Because Timken® bearings are made in 26 types, you get exactly the right tapered roller bearing for your job.

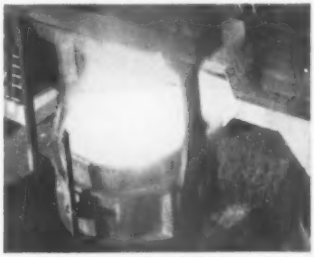


TOUGH INSIDE—HARD OUTSIDE. Case carburizing of rollers and races gives a wear-resistant surface, shock-resistant core.

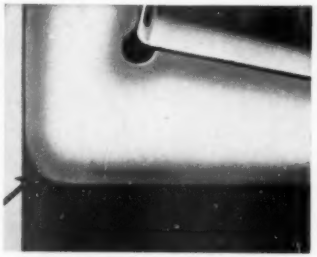


RIB OF CONE maintains roller alignment, prevents skewing, assures maximum bearing capacity.

5850 SIZES. If you need a tapered roller bearing smaller around than your finger or as large as 71½" in diameter, you can get it from The Timken Roller Bearing Company.



WE MAKE OUR OWN STEEL. Because Timken bearings are made of special alloy steel, produced in the Timken Company's own mills, they have extra strength and wear resistance.

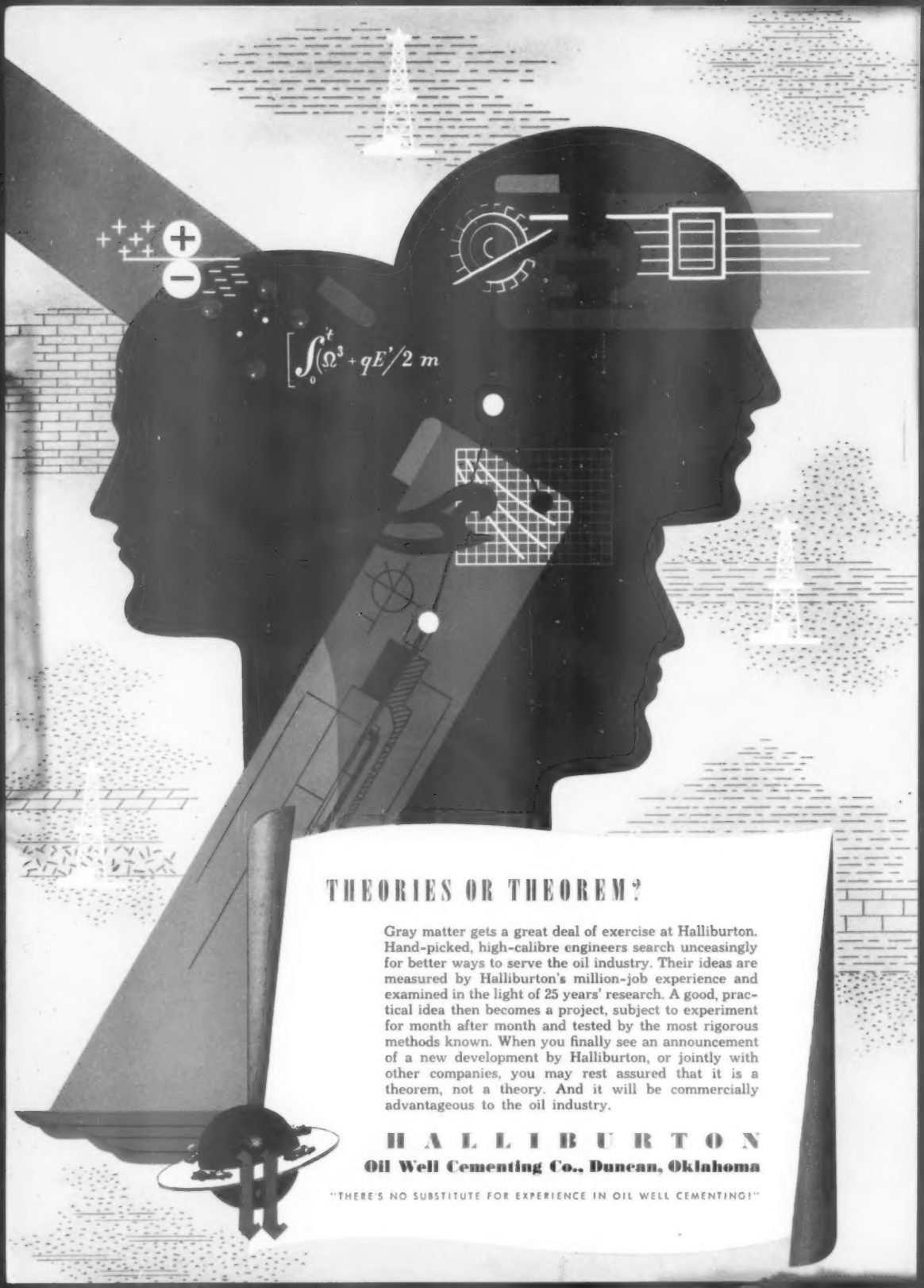


GENEROUS RADIUS on the inside diameter of Timken bearing cones permits greater shaft strength.

No other tapered roller bearing gives you all the advantages you get with Timken bearings. Be sure every tapered roller bearing you use carries the name "Timken", the trade-mark of The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ont. Cable address: "TIMROSCO".

TIMKEN
TRADE MARK REG. U.S. PAT. OFF.
TAPERED ROLLER BEARINGS

NOT JUST A BALL ◯ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ◫ AND THRUST ←◫→ LOADS OR ANY COMBINATION ✳



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- Petrochem Report: Jefferson Chemical Co., Port Neches.
- Drilling with Gas in West Texas.
- How to Carry Out Drilling Operations Safely.
- One-Man "Packaged" Gasoline Plant.
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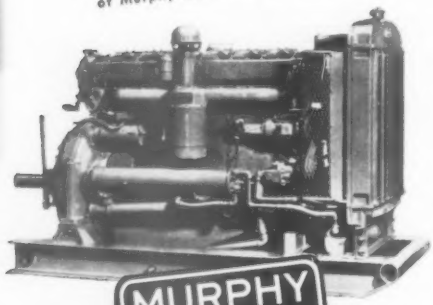
Mr. Wyant (left) and Mr. Wagner whose experience has proved the value of Murphy Diesels in the oil fields.

...REPEAT ORDERS ARE THE BEST PROOF OF OWNER SATISFACTION

The recent installation of a Murphy Diesel Model 122 to drive the mud pump of Wagner and Wyant's Rig No. 3 runs to 7 the number of Murphys which have been owned by this outfit. The new engine which is rated at 190 H.P., continuous and 210 H.P., intermittent powers a D-175 Emsco pump.

Repeat orders like this are the best proof of satisfactory engine service . . . and that's why we're proud of the fact that so many of the new Murphy Diesels going into the oil fields are going to people who have used Murphys before.

It will pay you to find out what Murphy can do for you. Call your Murphy Diesel Dealer, today.



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Heavy duty power
for the oilfields

Murphy Diesel Engines and Power Units for drilling and pipe line pumping, 90 to 226 H.P., 1200 and 1400 RPM. Generator Sets, 60 to 140 K.W. Dual-Fuel Engines, 135 to 180 H.P. Also Crude Oil Burning Engines.

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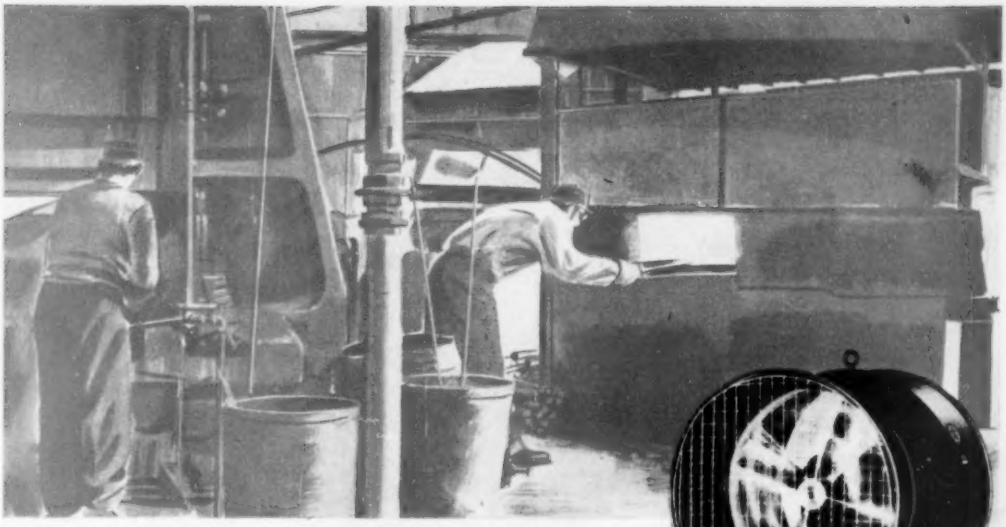

COOL HEADS IN "HOT SPOTS" WON'T LET YOU DOWN

On jobs where the air is foul or hot, men can't be blamed too much for letting up now and then. If you want to keep their efficiency and morale high, feed them better air.

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"OILWELL'S" No. 76 Rig..for 7,000 to 10,000 ft. drilling

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MEDIUM DEPTH DRILLING

"OILWELL'S" No. 66 Draw Works and companion No. 550 Drive is a compact rig—embodying the latest design features and is adapted for two or three engines and one or two pump drives. In this one rig, an operator has a choice of either a straight mechanical draw works or a torque convertor rig. By a simple change, possible in the field, the draw works can be changed from six speeds forward to three speeds forward when using torque convertor equipped engines. This rig also has the many field proven features which have contributed so much to the ease of handling and the outstanding performance of larger "Oilwell" rigs.

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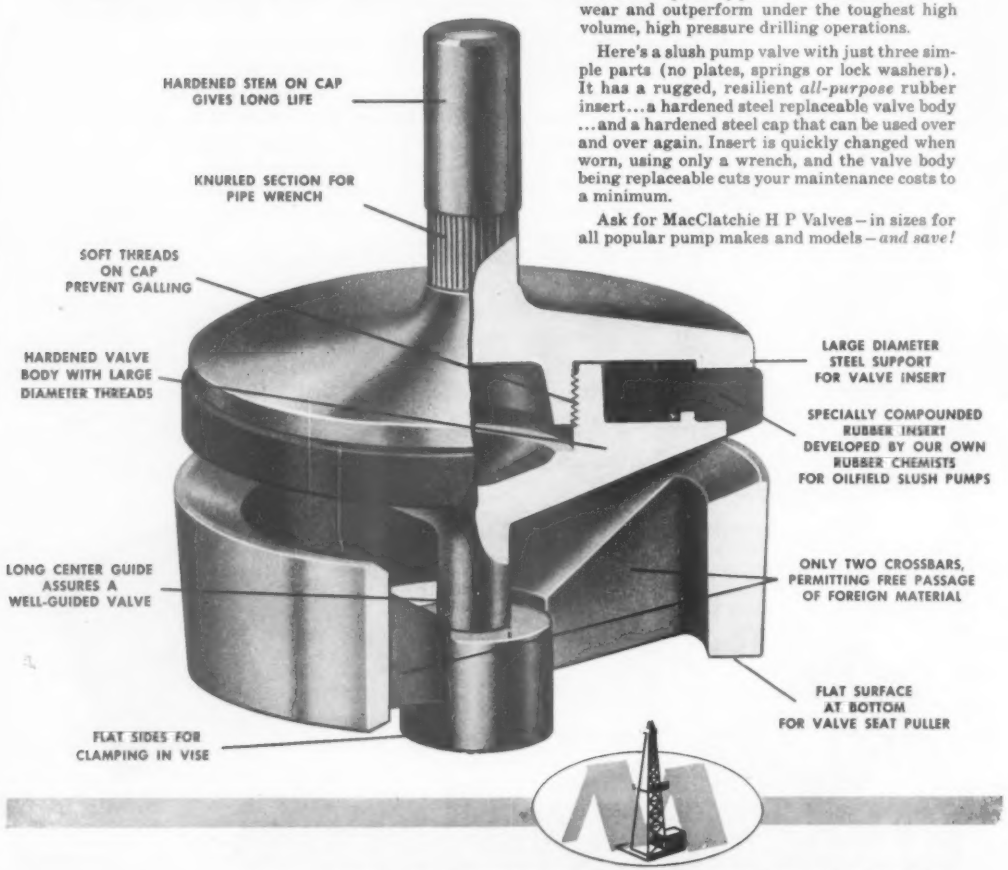
Ask for MacClatchie H P Valves – in sizes for all popular pump makes and models – *and save!*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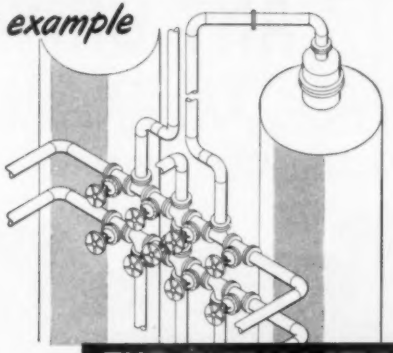

THE INSTALLATION

Nine Crane valves on control manifold to reaction chambers on Perco Cycloversion Unit. Bareco Oil Company, Wichita, Kansas.

VALVE SERVICE RATINGS

SUITABILITY:	Matches service needs
MAINTENANCE COST:	None to date
CORROSION-RESISTANCE:	O.K.
SERVICE LIFE:	Now more than 2 yrs.
OPERATING RESULTS:	Valve leakage stopped
PRICE:	In line
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Valves formerly used would not stay absolutely tight as necessary. Down time for repairs was excessive. Fluids handled: At oil inlet, straight run gasoline at 950 Deg. F., 85 psi; for catalyst regeneration, air-steam mixture at 850 Deg. F., 15 psi; regeneration waste gases, 1200 Deg. F. at 5 psi. Approximately 15-day cyclic operation.

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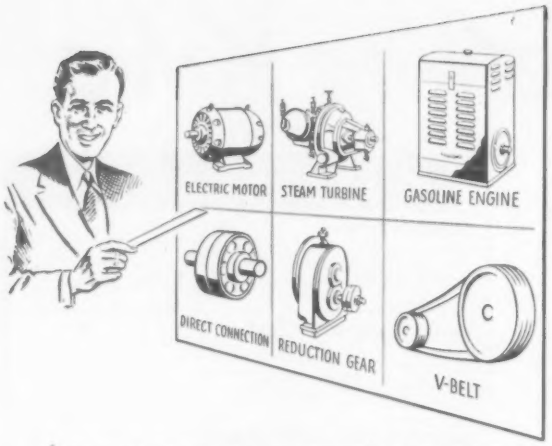

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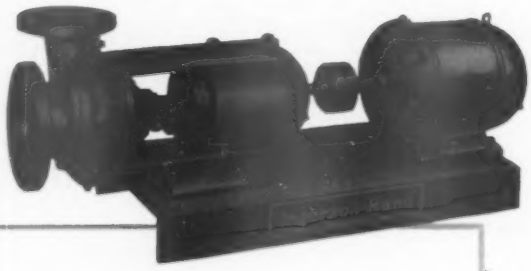

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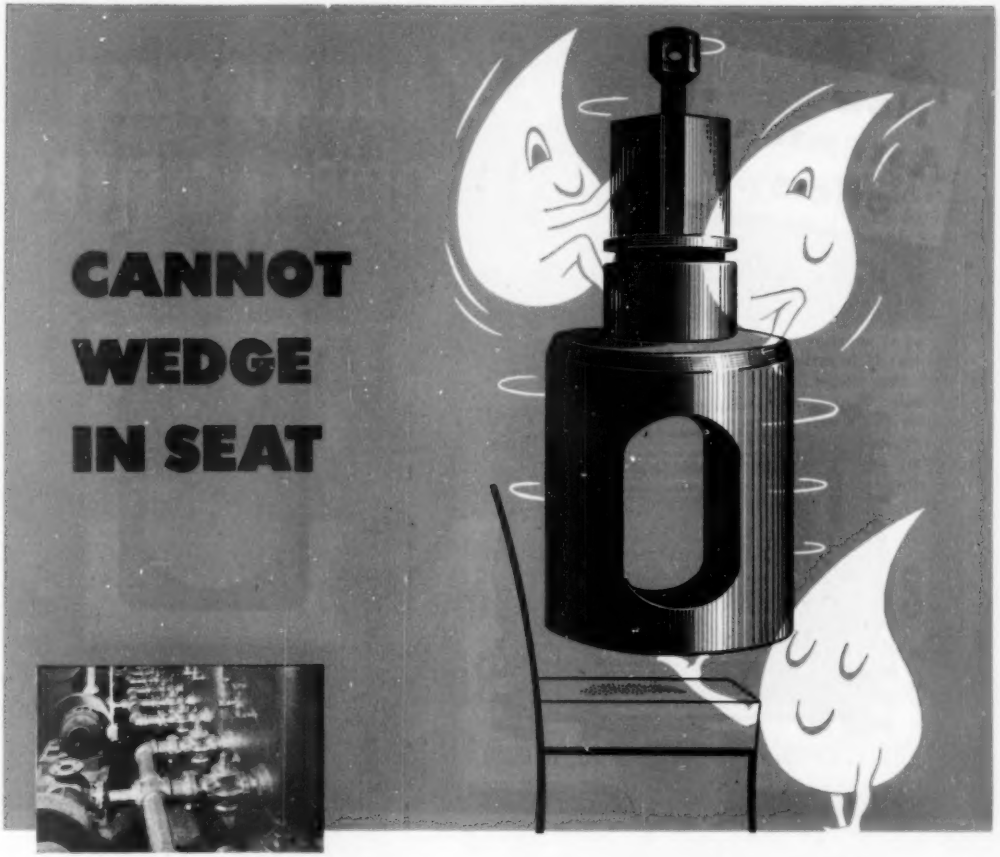

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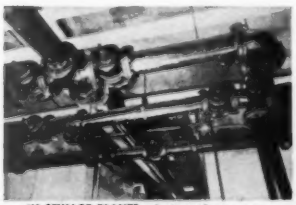

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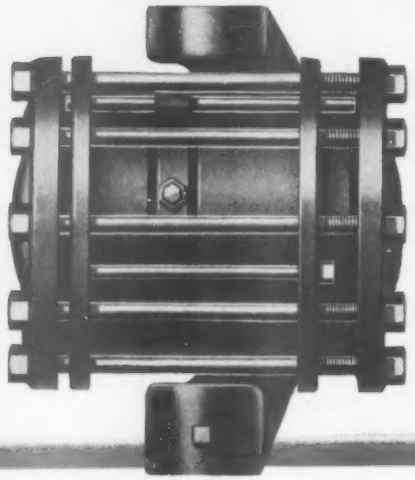

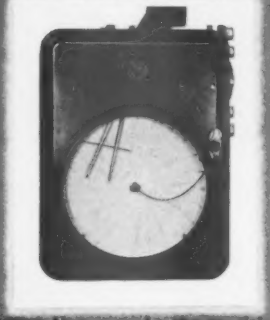

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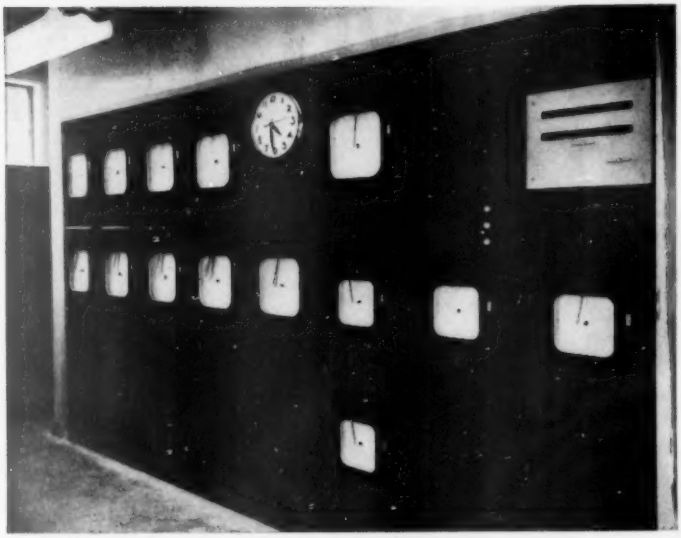


The picture to the left shows the control panel at the new Point Richmond Holder Station of the Pacific Gas and Electric Co. The Metameter Receivers on this panel record readings of flow and pressure at focal points of load in the distribution and transmission systems for the San Francisco Bay section. This installation is part of an elaborate system of Metameter telemetering and remote control, involving distances up to 50 miles, used on this company's far-flung network of pipe lines throughout northern and central California. This company is using Metameters that have been in operation since 1935.

METAMETER* TELEMETERS AT WORK IN SAN FRANCISCO

Remote Control and Telemetering Have Been Important Factors for Many Years in the Efficient Operation of Pacific Gas and Electric Company's Distribution Systems

BRISTOL METAMETER TRANSMITTER makes measurements and transmits information any distance over any two-wire circuit or its equivalent telephone circuits, private wires, radio (including microwave) and carrier channels.

BRISTOL METAMETER RECEIVER is available with round, narrow or wide-strip chart or as indicating receivers.

The value of remote control and telemetering in the efficient operation of a gas distribution system has been thoroughly demonstrated over the past 16 years by the Pacific Gas and Electric Company. Here, over 100 Bristol Metameter telemeters are used to record, at central control stations, the pressure and flow in gas lines at key points throughout its transmission and distribution systems. Continuous records of pressure and flow made immediately available to the dispatchers enable them to operate systems by remote control at peak efficiency. Write for Bulletin M-1700. The Bristol Co., 120 Bristol Rd., Waterbury 20, Conn.

Reg U.S. Pat. Off.

THE DEPENDABLE GUIDEPOST OF INDUSTRY

BRISTOL

AUTOMATIC CONTROLLING, RECORDING AND TELEMETERING INSTRUMENTS

PIPING THAT MOVES

. . . calls for supports that are flexible

Thermal deflection of piping in the high temperature piping systems of today's oil refineries requires supports that are flexible.

Where reactive forces at terminal points in a piping system must be kept within specified limits, constant-support type hangers are recommended. They are designed to provide substantially uniform supporting force equal to the pipe load throughout the travel range and should be used on high temperature and other critical lines.

When pipe lines are subject to vertical movement and restrictive conditions do not require the use of a constant-support type, variable spring hangers are recommended. They should be designed to support not less than 85% or more than 120% of the designed load for the total travel.

When necessary to prevent abnormal movement or vibration in pipe lines, controls or sway braces of the energy-absorbing or instant-acting, counter force type are recommended.

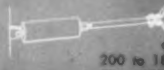
Grinnell manufactures a complete line of engineered pipe hangers and supports; maintains a laboratory staff of trained technicians; provides highly skilled assistance and advice right from the design stage; and offers experienced field engineering service.

Grinnell Pre-Engineered Variable Spring Hangers installed in one of the largest catalytic cracking plants.

Grinnell Constant Support on piping operated at temperatures up to 1100°F.

GRINNELL MODEL L CONSTANT SUPPORTS — maintain full safety factor in high temperature, high pressure systems. 3 physical structures accommodate maximum travel requirements of 2½ 5 and 10 inches; 16 sizes collectively cover numerous load ranges between 141 and 19,530 pounds.

GRINNELL PRE-ENGINEERED SPRING HANGERS — maximum variation in supporting force per ½" of deflection is 10½% of rated capacity — in all sizes. 16 sizes available from stock — load range from 74 lbs. to 9000 lbs.



GRINNELL VIBRATION CONTROL AND SWAY-BRACES — dampen vibration, oppose pipe sway and absorb shock. 3 sizes give full deflection forces from 200 to 1800 lbs.; have initial precompressed spring forces from 50 to 450 lbs. respectively.

GRINNELL

AMERICA'S #1 SUPPLIER OF PIPE HANGERS AND SUPPORTS

Grinnell Company, Inc., Providence 1, Rhode Island • Coast-to-Coast Network of Branch Warehouses and Distributors

pipe and tube fittings • welding fittings • engineered pipe hangers and supports • Thermolier unit heaters • valves
Grinnell-Saunders diaphragm valves • pipe • prefabricated piping • plumbing and heating specialties • water works supplies
industrial supplies • Grinnell automatic sprinkler fire protection systems • Amco air conditioning systems

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Low-cost parts inspection for smaller plants—fleet overhaul—specified inspection

For plant and field inspection of large equipment anywhere

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Serves as *your* inspection department to whatever extent you require or desire, at any stage of processing or production. Available through 11 Magnaflux Corp. Laboratories.

MAGNAFLUX
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Prevents unpredicted failure in critical production, construction and erection equipment by timely detection of faulty welds, fatigue cracks, fractures, etc. Ready to serve you in your plant or in the field anywhere in the United States.

THIS MAGNAFLUX-OWNED and OPERATED SERVICE offers you full facilities for non-destructive testing and inspection, where limited use or special requirements make investment in inspection equipment impractical.

It makes available to you *all* the inspection methods of Magnaflux Corporation: MAGNAFLUX, MAGNAGLO, ZYGLO—the "big 3" used by more industries, for more inspection operations than all other methods combined—as well as STATIFLUX, PARTEK, SONIZON and STRESSCOAT. One or another of these methods may be applied to magnetic or non-magnetic metals, glass, ceramics and other materials.

Magnaflux Commercial Inspection includes both Laboratory Inspection of parts—from one to 1,000,000—and Field Inspection of machinery and equipment *anywhere*.

By detecting defects *before* they waste materials, manpower or production time...by making invisible defects visible *before* machinery breaks down in service, Magnaflux Commercial Inspection is saving money for hundreds of companies. It is also preventing needless rejection of materials or parts for *seeming* defects that are actually harmless to service life.

If you have an inspection problem

—or must meet contract requirements for inspection—these booklets may help you with the practical solution. Mail coupon for either or both.

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Commercial Inspection Available Through 11 Principal Cities:
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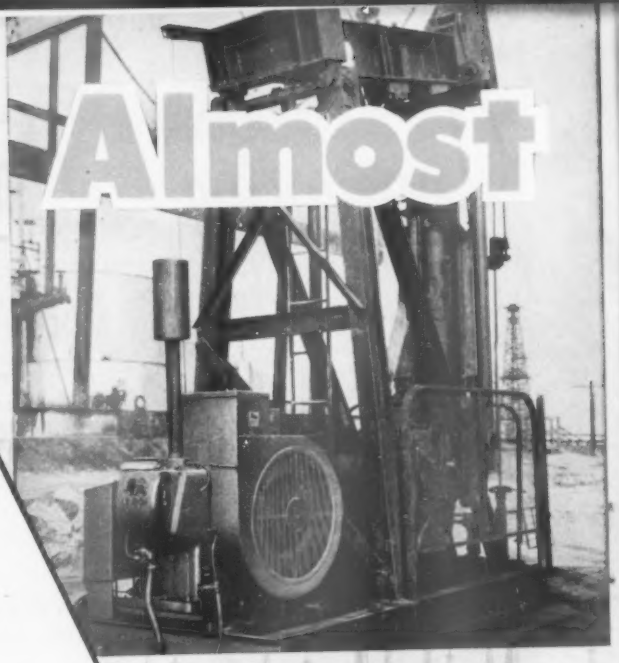
Almost



LE ROI

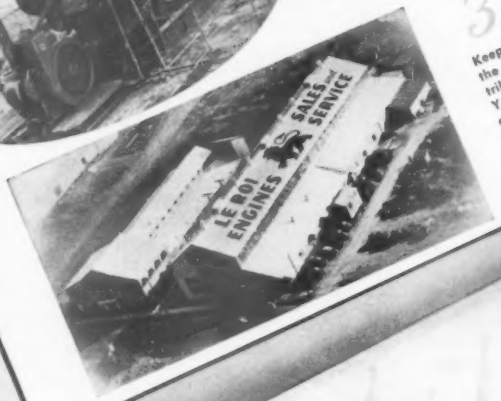
Le Roi 3 way Partnership

1. Better Engines

Le Roi's A288, for example. It has a wide speed range of 360 to 720 rpm. Its removable wet cylinder sleeves and other construction features simplify maintenance, reduce replacement costs. No shut-down is necessary for periodic inspections.

2. Better Applications

Exclusive Le Roi distributors are oil-field power specialists. They know engines. That's why they can select the right power unit for any application. That's why you can count on Le Roi for dependable, low-cost power.



3. Better Service

Keeping your Le Roi engines running is the sole responsibility of our distributors. They handle only Le Roi. You get personal attention from engine experts. Large parts-stocks and skilled mechanics assure prompt service and a minimum of down-time.

Le Roi A288 Pumping Engine

One typical installation shows more than 35,000 hours and it's just beginning its useful life. That's stamina — proof that Le Roi's A288 puts you way ahead of the field!

YOU don't have to pamper this pumping engine. No, sir — not Le Roi's A288. It's built to pump more oil — longer — safer — and with less maintenance — than any other well-pumping engine!

The A288 is the only engine to be recommended by one major pumping-engine user for continuous service *unattended for up to two weeks at a time.*

Here are just a few of the reasons for the A288's unfailing dependability:

- Patented, closed "vaporizing-condensing" cooling system requires almost no make-up water — keeps temperatures high and prevents sludging even in sour-gas areas.
- Heavy flywheel maintains even-speed operation under unbalanced loads.
- You don't have to shut down the A288 for periodic inspections or for adding oil.
- Big crankcase oil capacity permits long intervals between oil filling.
- There are no grease fittings, belts, or other accessories that need attention.

Let your Le Roi distributor tell you more about the A288 — and show you installations. See for yourself why you're way ahead of the field, when you let Le Roi's 3-way partnership work for you.

LE ROI COMPANY

MILWAUKEE 14, WISCONSIN

***Plants:* Milwaukee • Cleveland • Greenwich, Ohio — *Oil Field Headquarters:* Tulsa, Oklahoma**

LE ROI

See these Le Roi Distributors for a Profitable 3-way Partnership

Oklahoma
Le Roi Company Branch — Tulsa
Carson Machine & Supply Co. — Oklahoma City

East & South Texas, Gulf Coast
Southern Engine and Pump Company — Houston, Kilgore, Edinburg, Dallas, San Antonio, Corpus Christi, Texas, and Lafayette, Houma, Louisiana.

North & West Texas, New Mexico
General Machine & Supply Co. — Odessa, Snyder, Texas.
Nortex Engine & Equipment Co. — Wichita Falls, Texas.

Kansas
Carson Machine and Supply Co. — Great Bend

Illinois — Western Kentucky
Western Machinery & Engine Company — Centralia, Illinois and St. Louis, Missouri.

Typical Le Roi Service Facility

Here's the efficient well-arranged parts department of the Le Roi-Rix Co.'s Long Beach branch. Two more offices — at Bakersfield and Los Angeles — are similarly equipped. All three offices maintain prompt 24-hour service. Le Roi has service facilities like these throughout the oil fields — another reason why you can depend on Le Roi.

Michigan
Hafer Engine Service — Reed City

Rocky Mountain Area
Gehring Equipment Co. — Casper, Wyoming, Rangeley, Col.

Northern Louisiana & Mississippi
Ingersoll Corporation — Shreveport, Louisiana, and Jackson, Mississippi.

West Coast
Le Roi-Rix Machinery Co. — Los Angeles, Long Beach and Bakersfield, Calif.

Appalachian Area
P. C. McKenzie Co., Pittsburgh, Bradford.

Canada
Lucey Export Ltd. — Calgary, Edmonton, Alberta.

P-333

Chemicals you live by

From Here..

..to Here..

You're insured with Diamond Chemicals

Insured against costly shutdowns—drill string failures, and excessive maintenance costs for pumps and condenser. Use these DIAMOND CHEMICALS for these jobs:

SODIUM BICHROMATE AND CHROMATE as mud additives to control corrosion fatigue of drill pipe.

FLAKE CAUSTIC SODA, SODA ASH, BICARBONATE OF SODA, all in daily use as drilling mud control agents.

DIAMOND OIL-WELL GRADE SILICATE OF SODA, for use in heaving shale areas (licensed under Texaco Development Corporation. Available from Dallas only).

Behind your oil-field chemical dealer and mud agent stand DIAMOND plants at Houston and Dallas and warehouse distribution points at Houston, Dallas, Oklahoma City and Wichita, where the chemicals named above are carried in stock. They assure you that you'll get the material you want, when you want it.

DIAMOND CHEMICALS FOR THE OIL INDUSTRY

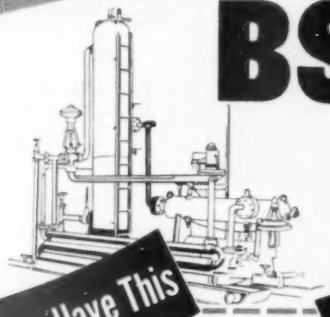
DIAMOND ALKALI COMPANY · CLEVELAND 14, OHIO

DIAMOND ALKALI CHEMICALS ®

STOP SHRINKAGE...

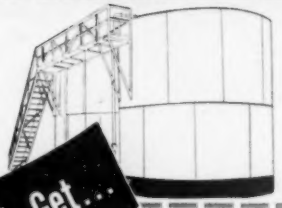
and send Extra Dollars to the stock tank by adding a

BS&B Stabilizer*



You Have This

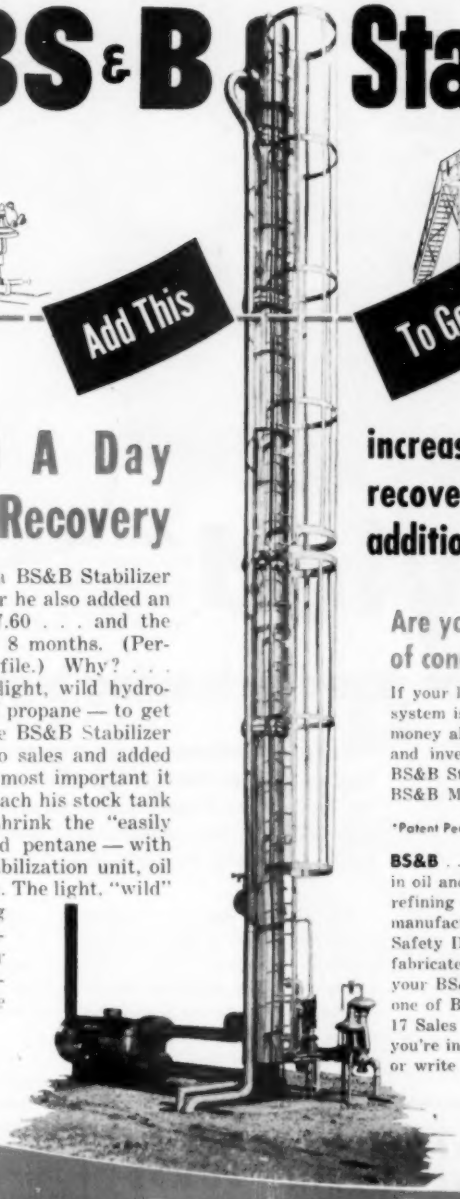
Add This



To Get...

Added $47.60 A Day To Stock Tank Recovery

When a Texas operator added a BS&B Stabilizer to his low temperature separator he also added an increased daily revenue of $47.60 . . . and the stabilizer paid out in less than 8 months. (Performance and test data is on file.) Why? . . . because he had to control the light, wild hydrocarbons — ethane, methane and propane — to get maximum recovery. Adding the BS&B Stabilizer meant he got the wild gases to sales and added BTUs to the sales line . . . and most important it meant the light gases did not reach his stock tank where they would flash and shrink the "easily influenced" gases — butane and pentane — with them. In this low cost field stabilization unit, oil is heated in a distillation column. The light, "wild" gases are stripped out taking little or none of the easily influenced gases with them. Oil vapor losses from intermediate separators and the stock tank are eliminated . . . profits go up.



increased stock tank recovery without producing additional reservoir fluid

Are you making 50 barrels of condensate per day?

If your low temperature separator system is doing this or more you'll be money ahead if you investigate and invest in the fast pay-out BS&B Stabilizer. Ask your BS&B Man.

*Patent Pending

BS&B . . . for 60 years a leader in oil and gas producing and refining equipment . . . also manufacturers of Climax Controls, Safety Devices and special fabricated pressure vessels. Ask your BS&B Man. There's one of BS&B's 35 Branches or 17 Sales Offices near you if you're in the Oil Country . . . or write . . .

EFFICIENCY BS&B RELIABILITY OUR 60TH YEAR

BLACK, SIVALLS & BRYSON, INC.

Oil & Gas Equipment Division Dept. 1-A8

2131 Westwood Blvd. Oklahoma City, Oklahoma

Layne's new all color and sound motion picture "DEEP WATER" brings to the screen a dramatic story of how Layne builds the world's finest water supply wells and pumps. For details on booking this picture for a showing without cost or obligation address Public Relations, Layne & Bowler, Inc., General Offices, Memphis 8, Tennessee.

"Styled"

for non-overloading high efficiency

All Layne Impellers—the business end of a pump—are "styled" for the very maximum in high efficiency. Free from the overloading fault, these impellers are capable of producing tremendous quantities of water at unmatched low cost. All are hand finished inside and out to provide utmost accuracy.

If you are in need of a vertical turbine pump to produce water from a well, lake, reservoir or river—or as a pressure booster for a water main, write for a catalog on Layne Pumps. No obligation.

But whether you are checking impellers, pump bowls, shafting, bearings or other parts of a water supply unit, it is important to remember that Layne built wells and pumps are rated as the world's very finest. Everything about these units, are engineered for long years of top flight efficiency. Satisfactory service, extra heavy production and absolute freedom from structural weakness.

For further information about well installation services, sizes and types of pumps or a complete water supply contract, address

LAYNE & BOWLER, INC.
General Offices, Memphis 8, Tenn.

Layne
WATER WELLS
VERTICAL TURBINE PUMPS
WATER TREATMENT

Eaton Tandems give you all these important features—

EATON AXLES—the load-carrying and moving components—are performance-proved by thousands of units and millions of miles of service. They are installed in the position for which designed and, therefore, are not subject to abnormal stresses or to unnatural lubricating problems.

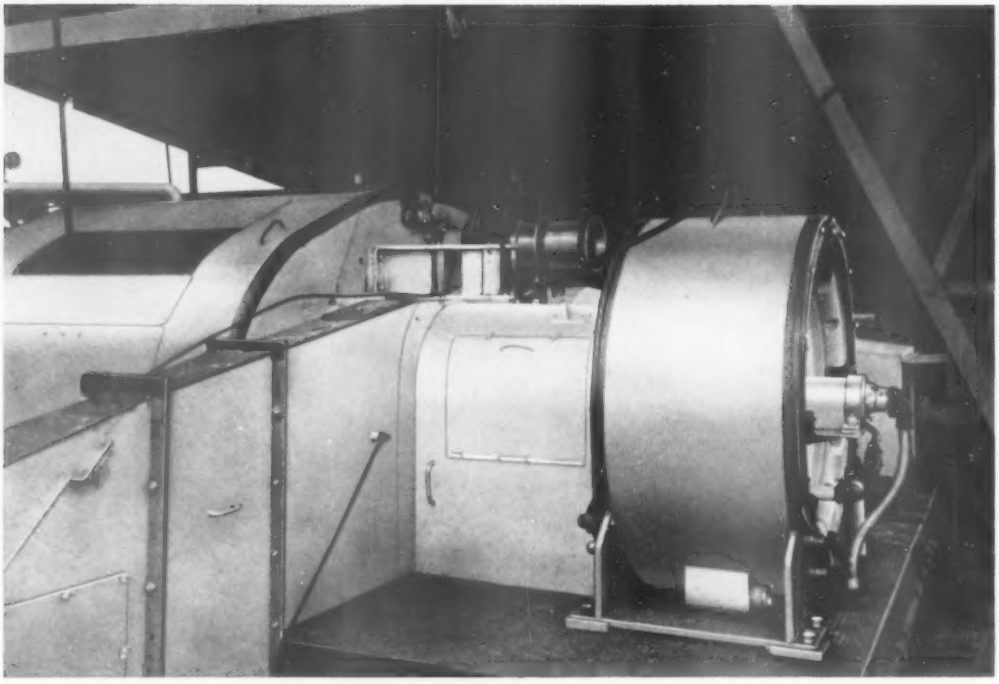
- The single drive line permits a natural angle and direct lead of the propeller shafts; eliminates excess parts; simplifies maintenance.
- The power divider, of simple design, assures the transmission of power equally to both axles.
- A third differential in the power divider assures equalized power transmission to the driving wheels even though wheel speed may be variable due to road irregularities or differences in tire diameter.
- The differential lock between forward and rear axles (optional on some models) is positive in action. With unfavorable road conditions such as mud, snow, and ice, this feature makes maximum traction available when required.

Your truck dealer will be glad to explain how Eaton Tandem Drive Axles give your trucks greater load capacity and at the same time reduce tire maintenance and operating costs.

EATON
Tandem Drive
AXLES

Axle Division
EATON MANUFACTURING COMPANY
CLEVELAND, OHIO

PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Snap Rings Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers



Set Slips on Heaviest Strings Without Brake Friction or Wear

The Dynamatic Drawworks Brake can be used while setting slips on the heaviest strings of pipe or casing without use of the friction brake. It is completely magnetic; involves no brake blocks or bands. Nothing to wear out.

- **Simple as a light circuit.**
- **Precision finger-tip control from driller's position.**
- **High torque at low speeds.**
- **Operates on ordinary light plant current.**
- **Proven in all major fields, including off-shore drilling.**
- **Readily applied to all rigs—large or small. Can be installed in the field.**

Available from drawworks manufacturers and their distributors. Write for illustrated literature.

DYNAMATIC
ELECTRO-MAGNETIC

DRAWWORKS BRAKES

EATON

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DYNAMATIC® CORPORATION • KENOSHA WISCONSIN

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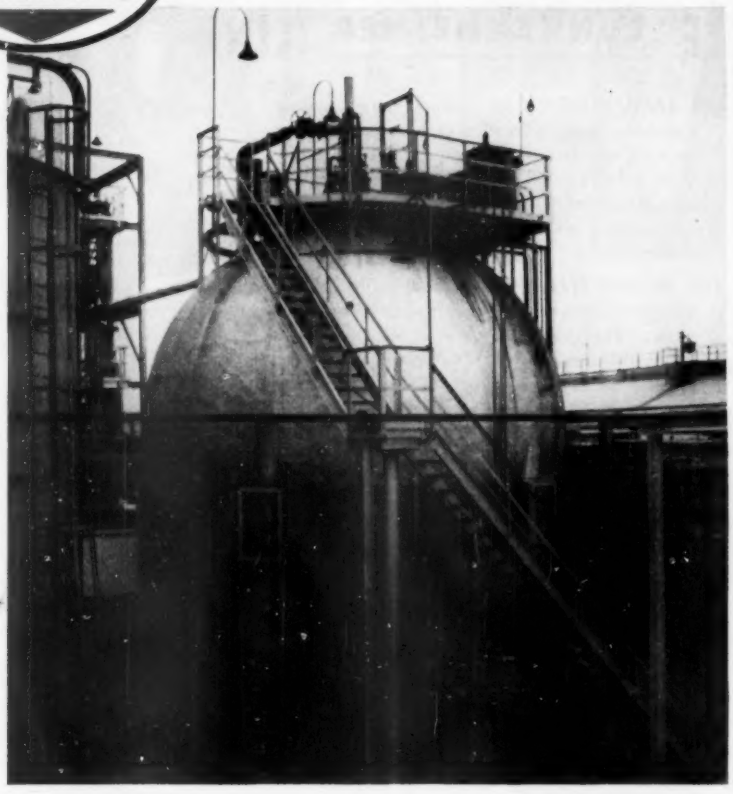
Dynamometers • Oil Well Drawworks Brakes • Adjustable-Speed Couplings • Eddy-Current Brakes
Ajusto-Spedes • Shovel Clutches • Press Drives • Lift Truck Clutches • Electronic Controls

SOHIO

another leading refiner who desalts with PETRECO



The Standard Oil Company of Ohio is a long-time user of Petreco Electric Desalting. Like many other oil industry leaders, Sohio installed a Petreco desalting plant in one refinery, then repeated with Petreco in another.

The merit of a refining process often can be appraised by the caliber of the refining organizations who install, use and re-order. Petreco invites you to check into the large number of leading refiners who, like Sohio, use Petreco Electrospheres.

For descriptive literature and complete information on Petreco desalting, call or write

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PETRECO DIVISION

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1390 E. BURNETT ST., LONG BEACH 6, CALIF.

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CRUDE OIL: **REMOVAL OF SALTS, SOLIDS AND OTHER IMPURITIES; DEHYDRATING**
DISTILLATES: **ACID, CAUSTIC AND DOCTOR TREATING**
FUEL STOCKS: **DESAPONIFICATION**

PR 52-4

YOU SAVE 5 WAYS

WHEN YOU ORDER VALVES FROM THE COMPLETE LUNKENHEIMER LINE

YOU SAVE IN INVENTORY — because Lunkenheimer Valves are gauged to such close tolerances that parts are readily interchangeable and replaceable. With a *few* Lunkenheimer Valves in stock, you have the assemblies required to meet many service conditions — with no delay for costly "tailoring" of parts.

1

YOU SAVE IN MAINTENANCE—because Lunkenheimer Valves are service-engineered for *particular* applications. They give you trouble-free performance in all the services for which they are recommended. And the Lunkenheimer line is *complete*.

2

YOU SAVE IN PRODUCTION — because you needn't worry about costly "down-time." Lunkenheimer Valves stay on the job — month in, month out. The finest alloys and outstanding craftsmanship assure you of long, trouble-free service.

3

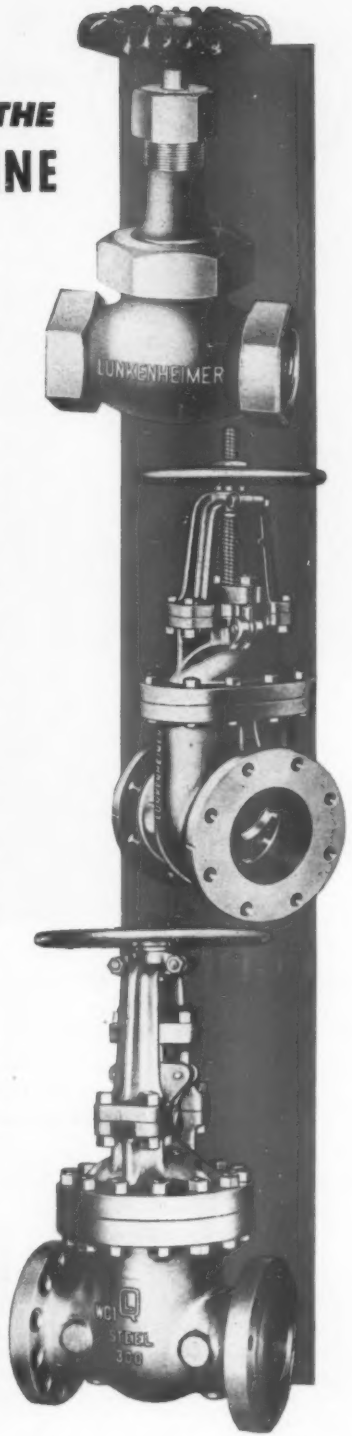
YOU SAVE IN ORDERING — because the nation-wide network of Lunkenheimer "blue-chip" distributors gives you fast local service. You can fill *all* your needs from the complete Lunkenheimer line — save shipping costs . . . simplify your ordering and handling.

4

YOU SAVE IN FINAL COST — because Lunkenheimer Valves offer you unmatched quality in materials, design, and workmanship. Whether you need bronze, iron, or steel valves — in whatever size or pattern —you can count on dependable performance from the *complete* Lunkenheimer line.

5

WRITE FOR literature on Lunkenheimer Bronze, Iron, or Steel Valves. Where possible, describe your typical valve applications. For quick local service, call your Lunkenheimer Distributor. The Lunkenheimer Co., Box 360F, Cincinnati 14, Ohio.



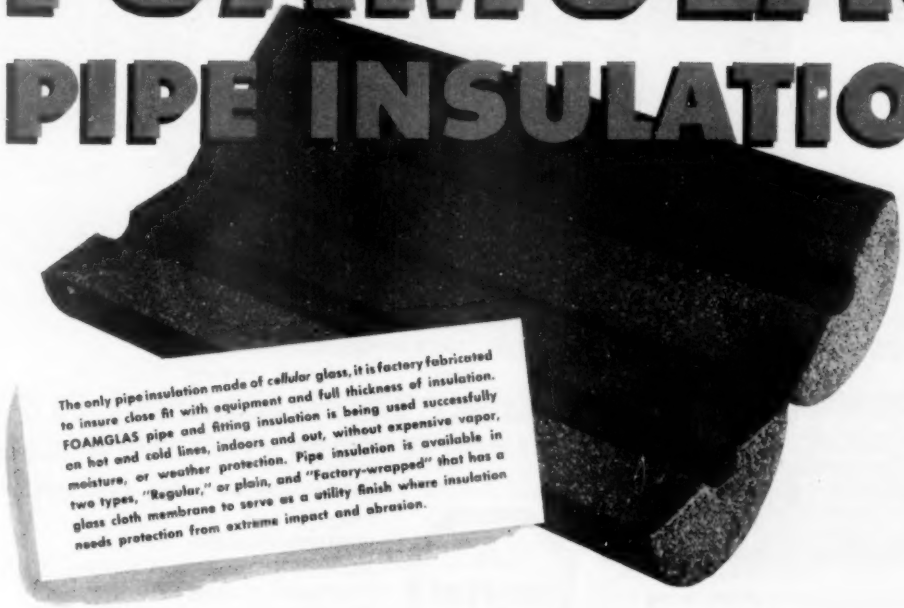
BRONZE • IRON • STEEL

LUNKENHEIMER

THE ONE *Great* NAME IN VALVES

L-651-17

THIS IS FOAMGLAS® PIPE INSULATION


The only pipe insulation made of cellular glass, it is factory fabricated to insure close fit with equipment and full thickness of insulation. FOAMGLAS pipe and fitting insulation is being used successfully on hot and cold lines, indoors and out, without expensive vapor, moisture, or weather protection. Pipe insulation is available in two types, "Regular," or plain, and "Factory-wrapped" that has a glass cloth membrane to serve as a utility finish where insulation needs protection from extreme impact and abrasion.

There is no other insulation like it . . . Here's why:

FOAMGLAS is not a fiber, a batt, a blanket, wool or board. It contains no granular or organic material. It is composed entirely of still air sealed in millions of minute glass cells.

FOAMGLAS eliminates the need for extra moisture and vapor barriers. It is practically impervious to fumes, chemicals and many other elements, therefore *retains* its original insulating efficiency throughout exceptionally long service.

FOAMGLAS is an effective barrier to heat flow. It helps maintain predetermined temperatures. It is being used successfully in many and varied high and low temperature applications on pipe lines.

FOAMGLAS is light, strong, rigid, durable. It cannot burn. Insects and vermin cannot nest in it, eat into or through it. FOAMGLAS needs no special type weatherproofing when used outdoors.

Pittsburgh Corning Corporation
Dept. DD-82, 307 Fourth Avenue, Pittsburgh 22, Pa.

Please send me without obligation a sample of FOAMGLAS and your FREE booklet on the use of FOAMGLAS for Piping and Process Equipment.

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PITTSBURGH CORNING CORPORATION · PITTSBURGH 22, PA.

Koppers expands service on American Hammered

Industrial and Aircraft Piston Rings

BECAUSE of the sale of its automotive replacement piston ring business Koppers now is in a position to further increase its leadership in piston and sealing rings for aircraft, general industrial, marine, commercial engine, railroad and oil field applications.

To present and prospective users of Koppers American Hammered Industrial Rings, this means increased engineering service, through concentrated attention to the solution of industrial and aviation ring problems; and greater production capacity for both original equipment and replacement rings. Our available manufacturing facilities include:

A large foundry equipped for both static and centrifugal casting . . . a modern heat-treating plant . . . one of the largest and most up-to-date chromium plating plants . . . modern machine shops . . . an efficient engine test laboratory . . . a modern and complete piston ring research laboratory.

In industrial and aviation rings, American Hammered *means* Koppers . . . builders of *engineered* products for industry.

Write, wire or phone us for the right answer to your piston or sealing ring problems, today. KOPPERS COMPANY, INC., *Piston Ring Department*, 1558 Hamburg Street, Baltimore 3, Maryland.

KOPPERS

Koppers American Hammered Industrial Piston Rings

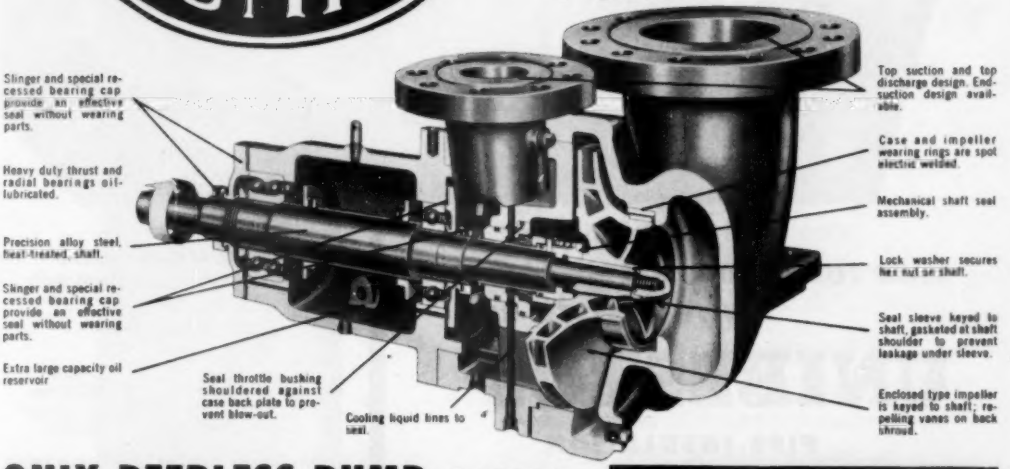
Only* KOPPERS *can furnish K-Spun® and Porous Chrome!

A PROVED IMPROVEMENT FROM PEERLESS

PEERLESS PUMPS

Type PRS

REFINERY AND CHEMICAL PROCESS PUMP


Slinger and special recessed bearing cap provide an effective seal without wearing parts.
Heavy duty thrust and radial bearings oil-lubricated.
Precision alloy steel, heat-treated, shaft.
Slinger and special recessed bearing cap provide an effective seal without wearing parts.
Extra large capacity oil reservoir
Seal throttle bushing shouldered against case back plate to prevent blow-out.
Cooling liquid lines to seal.
Top suction and top discharge design. End-suction design available.
Case and impeller wearing rings are spot electric welded.
Mechanical shaft seal assembly.
Lock washer secures hex nut on shaft.
Seal sleeve keyed to shaft, gasketed at shaft shoulder to prevent leakage under sleeve.
Enclosed type impeller is keyed to shaft; repelling vanes on back shroud.

ONLY PEERLESS PUMP OFFERS THIS HEAVY DUTY PROCESS PUMP—

***designed with and for a* MECHANICAL SHAFT SEAL**

SHAFT SEAL DESIGN PERMITS USE OF SHORT SHAFT WHICH MEANS LESS DEFLECTION, GREATER RIGIDITY, MINIMUM RUN-OUT, LESS WEAR IN BEARINGS, WEAR RINGS, SEAL AND MOVING PARTS... A first from Peerless! This heavy duty, center-line-mount pump designed with and for a mechanical shaft seal also has many other advantages including: **GREATER SAFETY:** Throttle bushing is shouldered against case back plate from suction side; cannot blow out even under maximum operating pressure. **GREATER ECONOMY:** No premium is charged in first cost for the mechanical shaft seal construction of the Type PRS pump. Lower maintenance costs will be effected throughout its longer life. **AVAILABILITY:** Peerless Type PRS pumps are available for quick assembly and shipment from Peerless' Los Angeles stock in several sizes.

USE IT FOR PUMPING

All petroleum hydrocarbons, process liquids, hot oil, water, at elevated temperatures and pressures. Liquid end case can be furnished in material suitable to the service.

HERE ARE ITS CHARACTERISTICS

Capacities:	up to 1000 gpm
Operating Heads:	up to 625 feet
Case Pressures:	up to 400 psig
Temperatures:	up to 250° F
Drives:	horizontal electric motor is standard; other types available as required.

WRITE FOR INFORMATION

PEERLESS PUMP DIVISION
FOOD MACHINERY AND CHEMICAL CORPORATION
301 West Avenue 26
Los Angeles 31, California

Please send us information on the Type PRS pump.

Name_____

Company_____

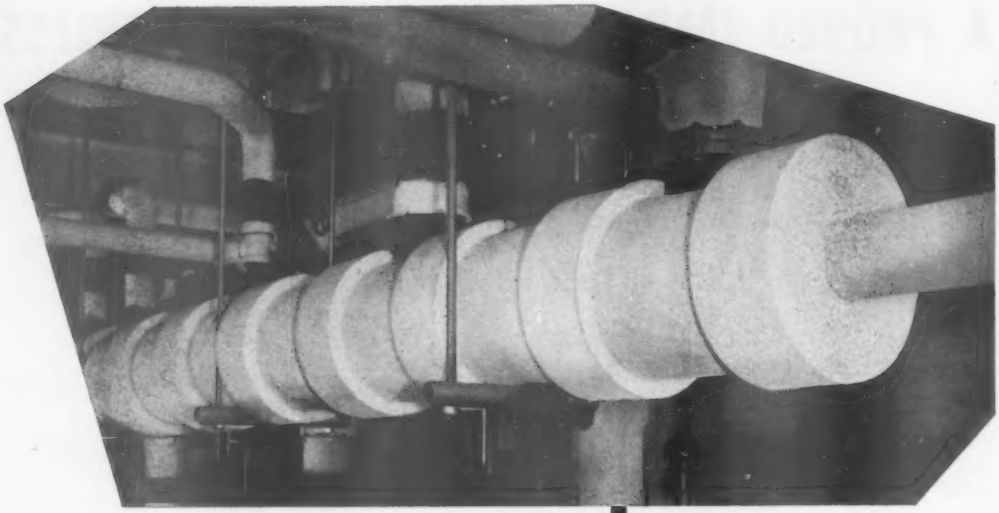
Street_____

City_____ State_____

O & GJ

PEERLESS PUMP DIVISION
FOOD MACHINERY AND CHEMICAL CORPORATION
Address inquiries to Factories at:
Los Angeles 31, California, and Indianapolis 8, Indiana
Offices: New York, Atlanta, Chicago, St. Louis, Phoenix, Fresno, Los Angeles, Dallas, Plainview and Lubbock, Texas; Tulsa, Albuquerque, N. M.
Distributors in Principal Cities; Consult your Telephone Directory.

PEERLESS PUMPS FMC



MAKE TOUGH JOBS EASY

WITH EASY-TO-USE

UNIBESTOS®

PIPE INSULATION

Ask any user about Unibestos! He'll tell you how easily this good insulation is cut and fit on-the-job, for Unibestos is light, strong, firm—saws cleanly for tight joints—retains initial high efficiency. It is unaffected by service hazards.

Whether you specify Unibestos No. 1200 (for temperatures up to 1200°F.), Unibestos No. 750 (for temperatures up to 750°F.), or Amocel for commercial uses (temperatures up to 600°F.), you'll always save in two ways: (1) quick and simple application; (2) long-lived durability. Your Unarco Distributor can supply you quickly from his stocks of these pipe insulations. Also available in block form for temperatures up to 1200°.

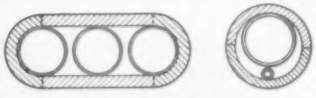
For details on these insulations, ask for Bulletin No. 76-109.

UNARCO

Write for the name of the Unarco Warehousing Distributor in your area.

SEE HOW THESE TYPICAL APPLICATIONS ARE SIMPLIFIED

Unibestos pipe insulation is particularly adaptable for insulating irregular surfaces such as flanges, valves, and fittings. Its firmness and easy-to-fit characteristics make such jobs easy; save time.



Unibestos pipe insulation and block can be used separately or in combination for insulating nested and traced lines quickly and economically.

For insulating pipe bends Unibestos can be mitered easily, and cemented-in with Unarco No. 50 insulating cement.

UNION ASBESTOS & RUBBER COMPANY

DEPT. E-8 • 332 SO. MICHIGAN AVENUE • CHICAGO 4, ILLINOIS

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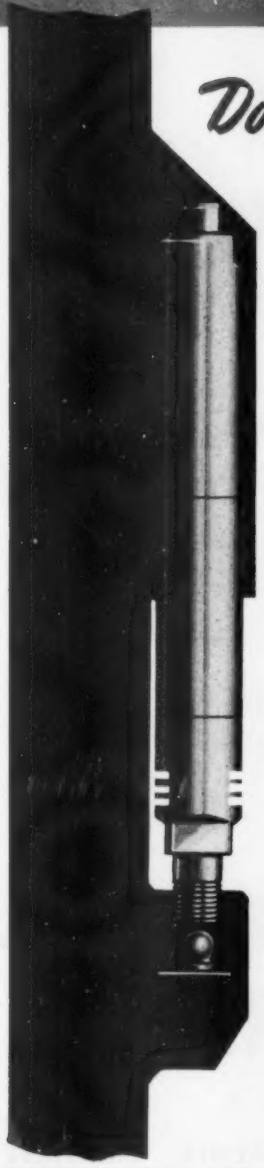
BUT GUIBERSON DOES IT!



Double Duty Type 'A' Flow Valve

With Tungsten Carbide Ball and Seat

produces continuous or intermittent flow with only a surface equipment adjustment

Install Type "A" on any continuous flow operation. When production falls to a level where intermittent flow is required—*a simple surface adjustment* produces well with maximum efficiency and economy. No need to round trip tubing to change valves.

Guiberson Surface Control Equipment...

is designed and built specifically for gas lift. Rugged, weatherproof Type "A" Motor Valve and Time Cycle Controller or Pressure Controller are easy to get to, easy to operate, easy to adjust.

Write today for the new
GUIBERSON GAS LIFT MANUAL

Guiberson Gas Lift Equipment is protected by the following patents

2,146,429	2,227,132	2,271,650	2,340,038	2,381,710
2,169,094	2,230,197	2,282,798	2,347,630	2,377,881
2,169,693		2,303,230	2,398,944	2,411,313

Other patents pending

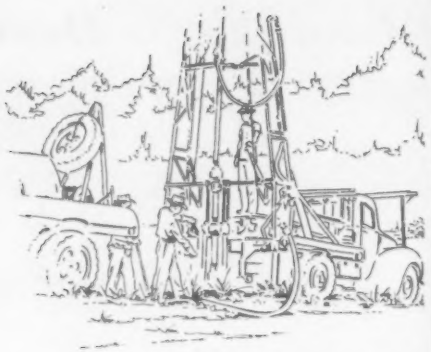
THE

GUIBERSON

CORPORATION

DALLAS 9, TEXAS, U. S. A.

Sold By Leading Oil Field Supply Stores Everywhere



FLOYD KISLER, *one of Independent's younger Party Chiefs, has had 8½ years of continuous geophysical experience. He came to Independent from the Louisiana State University, and worked as a computor and on other key jobs with field crews before becoming Party Chief.*

In Geophysical Work EXPERIENCE is your best assurance of SUCCESS

The record of results achieved during more than 20 years of service to many important oil producers is your assurance of satisfactory returns on your investment in an Independent geophysical survey. Founded in 1932, Independent is one of the oldest exploration contractors in the world operating continuously under the same ownership and management.

Your inquiries are invited.

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IXC

Independent *Geophysical Surveys*

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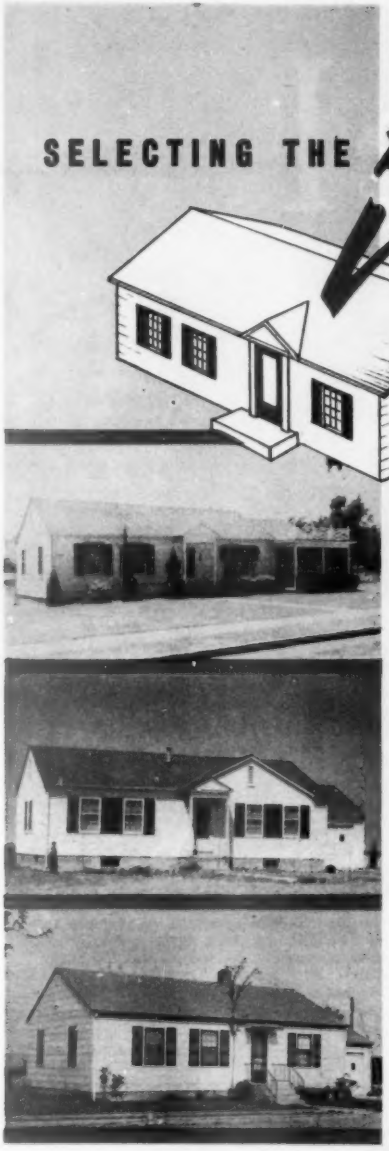
ESTABLISHED 1932

SELECTING THE *RIGHT* FIELD HOUSING IS *IMPORTANT...*



It's good employee relations to see that oil field workers have comfortable homes. It is good business to select field housing that has proved right for the oil industry for almost 35 years.

STURDYBILT Prefabricated Houses are *right* for the oil fields because they are economical, easy to erect, can be moved from one site to another, and are handsome and comfortable enough to suit the most particular oil field family.

Get the RIGHT field housing. Order STURDYBILT Prefabricated Houses.

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STURDYBILT PREFABRICATED, DEMOUNTABLE HOUSES

SOUTHERN MILL & MANUFACTURING CO. • TULSA, OKLAHOMA

STURDYBILT HOUSES COMPLY WITH COMMERCIAL STANDARD CS125 OF THE NATIONAL BUREAU OF STANDARDS FOR PREFABRICATED HOMES

Steel

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LABORATORY FOR THE ADVANCEMENT OF QUALITY

Another Electric Furnace Increases Sheffield Steel Making Capacity

At both the Houston and Kansas City Sheffield steel mills, ultra modern electric furnaces supplement the many open hearth furnaces in making Sheffield Steel. Also added to Sheffield's steel making facilities is a new and modern laboratory.

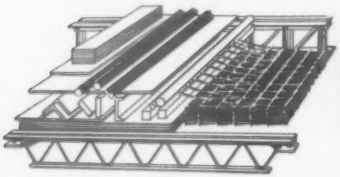
Steel enters into every product. Steel is either a part of the product or is used in its production—or both.

Advancement of quality in many products very often must begin in the steel maker's laboratory.

At Sheffield Steel Mills is the most versatile metallurgical laboratory West of the Mississippi and East of the Rockies. It is complete with chemical and physical equipment. Its technical staff continuously searches for improved formulae for a wide diversity of steels and for better processes of heat treatments under automatic pyrometric control.

Then, from raw materials to finished steel, samples are micro and macro etched and photographed for metallurgical observation of porosity, grain structure and faults. The physical laboratory constantly runs impact, fatigue, tensile and hardness tests including stress-strain diagrams.

And, Sheffield's advancement of quality to higher and higher levels goes beyond this. Inspection data is analyzed at every step of manufacture by statistical methods. Thus statistical quality control quickly points out the slightest variation from the high uniform level prescribed.



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Single Source For Many Steel Shapes

Very few products or projects can be manufactured or constructed properly without steel in some form.

Rounds, flats, angles, channels, squares, sheets and plates are some of the shapes supplied to manufacturers by Sheffield in addition to bolt products, nails, tacks, spring wire and other wire products.

Crescent bars and welded wire mesh for reinforcing concrete, structurals and steel joists are special products made by Sheffield for the construction industry.

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THE DEFENSE LINES NOW!

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SPECIALISTS IN SERVICE

keeps things moving when the trucking is rough

Spicer Brown-Lipe Clutch service is measured in terms of years, operating under every condition of truck service encountered in the industry. Special features include:

UNIFORM OVERALL PRESSURE. Through 360° of pressure plate.
SIMPLE SCREW THREAD ADJUSTMENT. Permits quick, easy adjustment.
LONGER BEARING LIFE. Completely shielded release bearing.
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NO CHATTER. Assures longer life.
LOW PEDAL PRESSURE. Remains essentially constant throughout clutch life.
FEWER PARTS. Greater efficiency with less upkeep.
INSULATED SPRINGS. Heat from plate cannot destroy their temper.
ECONOMICAL. Delivered completely engineered—not necessary to design or purchase special transmission front bearing caps, clutch release bearings or housings.

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for **DEEPEST** Drilling . . .

for **HARDEST** Drilling . . .

on **LAND** or **WATER!**

THE IDEAL® TYPE 160

Ten years ago an engineer's dream—
six years later an Oil Show highlight—
today the IDEAL Type 160 Consolidated Rig is the heavy-weight champion in drilling equipment.

Designed to probe subterranean depths of 20,000 feet and over, and to be of unmatched ruggedness in toughest drilling at any depth, the Type 160 represents the oil industry's aggregate knowledge of everything that equipment for ultra-deep drilling must embody.

Powerful draw-works, hoisting tackle, diesel engines and pumps, with the last word in automatic control equipment and related heavy-duty tubular products, are brought together in a custom-built team of unusual stamina, flexibility and responsiveness. Together they combine technical advances never before built into *any* drilling equipment.

Yet, all the outstanding features of this 20,000 foot power drilling rig are secondary to the economic purpose of its existence. The basic design concept of the Type 160 stems solely from the hard fact that the oil industry, as it pushes exploration to greater and greater depths, must minimize its dollar risk with drilling equipment of maximum *over-all* economy. (The fallacy of low first cost has been quickly exposed in this hard-fought contest with Nature, where the odds are great and the stakes keep growing higher.)

Hence, in the IDEAL Type 160 Consolidated Rig, you will find that the governing purpose of its design is to combine truly adequate power, speed, dependability and efficiency to achieve *lowest cost per foot of hole*.

If you have a project involving *deep* drilling or *hard* drilling, on water or land, with greatest possible *over-all* economy, the IDEAL Type 160 Rig is well worth investigating. It helps to illustrate, once again, why The National Supply Company is today the world's largest manufacturer of oil field machinery and equipment.

BLUE

THE NATIONAL SUPPLY COMPANY

GENERAL SALES OFFICES: PITTSBURGH 30, PA.

DIVISION OFFICES: Casper • Ft. Worth • Houston • Pittsburgh • Tulsa • Torrance
CANADA: The National Supply Company, Ltd., 702 Barron Bldg., 610 Eighth Ave., West, Calgary, Alberta
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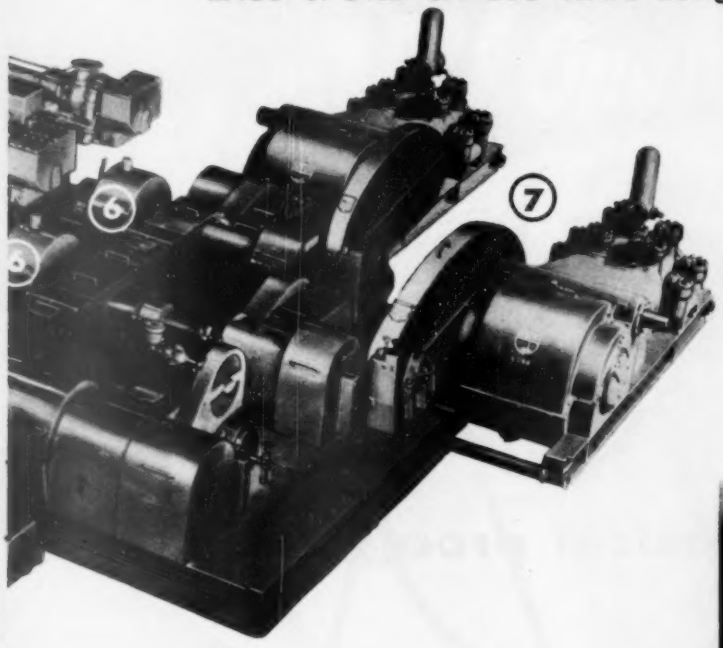
NATIONAL OIL FIELD MACHINERY AND EQUIPMENT • SPANG STEEL PIPE • SUPERIOR & ATLAS ENGINES

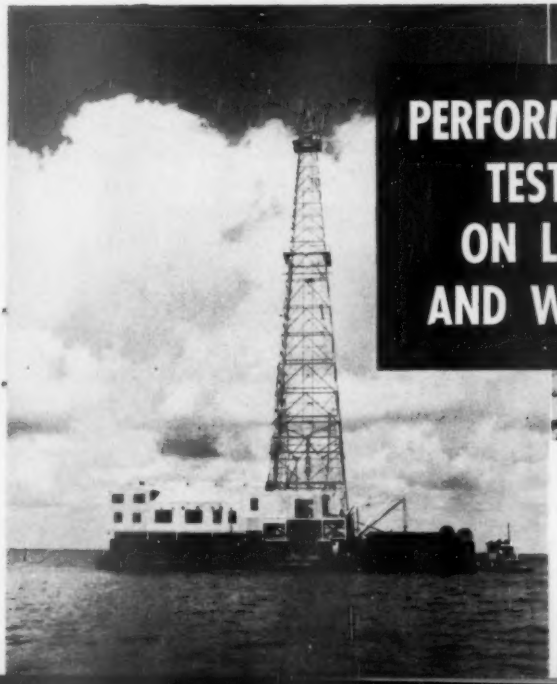
LAST WORD IN BIG RIGS designed to handle greater loads with more power and with greater facility—thus drilling deep wells with more speed.



1 Draw works, Ideal Type 160 Consolidated Rig
2 Control Position
3 Ideal Micromatic Drilling Control
4 Ideal Universal Cathead
5 Superior Supercharged Diesel Drilling Engines
6 Ideal-Gyrol Fluid Drive
7 Ideal Duplex Power Pump
8 Ideal Shaft Drive Rotary Machine

CONSOLIDATED RIG

PERFORMANCE-TESTED ON LAND AND WATER!



The first Type 160 Consolidated Rig to be manufactured helped set a new world's record in 1949 by drilling 20,521 feet in Wyoming under some of the most difficult conditions of both underground structure and weather.

The versatile Type 160 Rig on a drilling barge in Louisiana. This installation in constant use for over 2 years is believed to make a new record in drilling capacity for floating rigs.

petrochemical processes

phenol
methanol
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Foster Wheeler has been actively associated with both the petroleum and chemical industries for over 30 years and has designed and constructed many individual petrochemical process units as well as complete chemical plants.

FOSTER WHEELER CORPORATION

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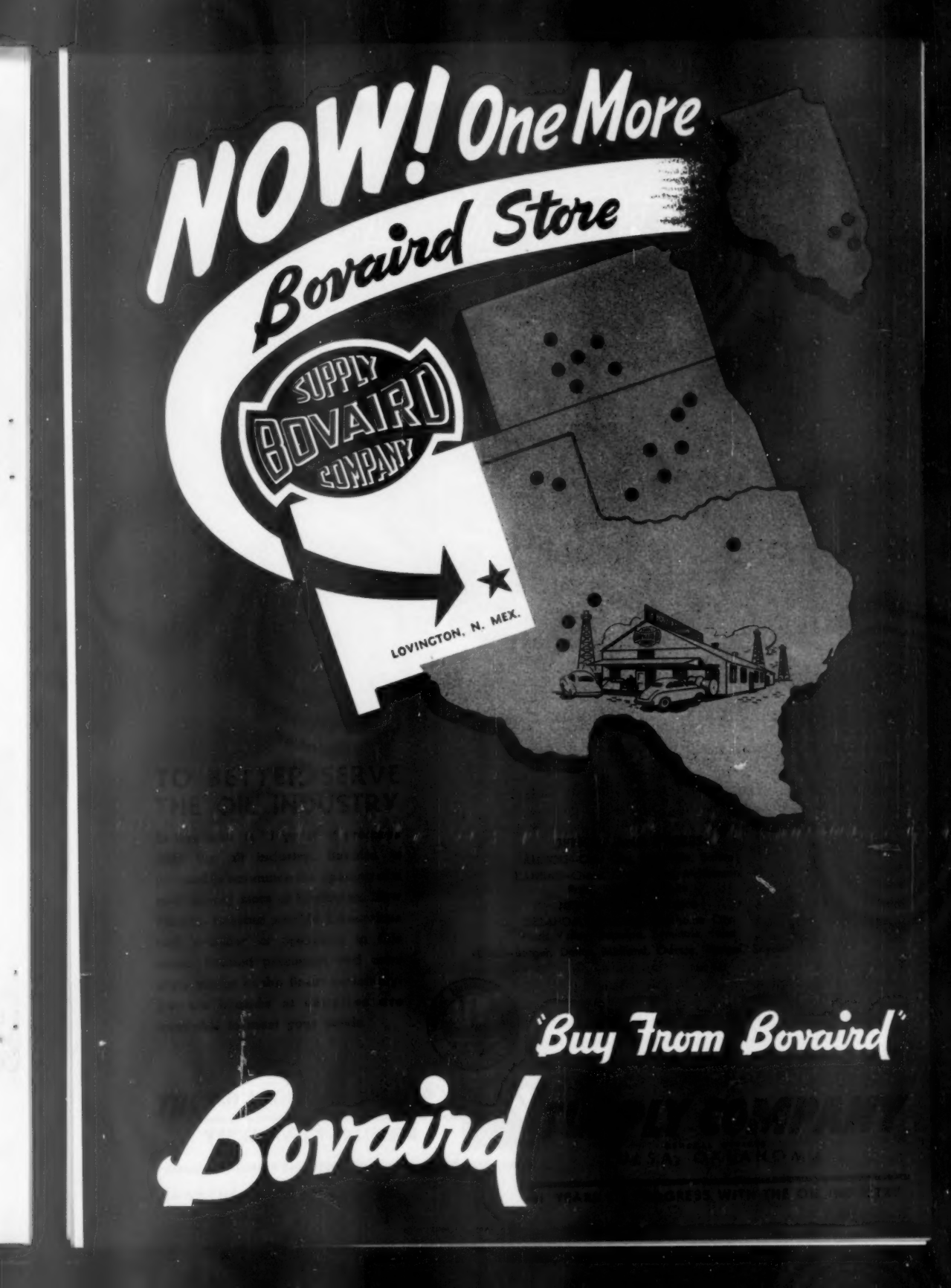
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Drop Forged SteelS

W-S Screw-End and Socket-Weld Fittings

That's right, W-S emphasizes the *plural* when it comes to the various steels for forged fittings.

From Monel down to the full range of carbon types, including low sulphur and phosphor-controlled grades, W-S *forged* fittings spark the trend toward specialized materials for specialized needs.

What's *your* problem? STRENGTH? W-S is a leading supplier to the high-pressure, high-temperature power industry. CORROSION? W-S stainless and alloy fittings tie America's main arteries of chemical production. SANITATION? W-S is a big producer of the popular Type 304 for food and pharmaceutical operations. Low temperature? Another W-S specialty.

And there's one problem common to all . . . COST. Let us show you how W-S *forged* fittings provide the lowest *service* cost obtainable.

9-M-2

• Stronger • Smaller • Lighter • Tighter
• More Uniform • Lower Service Cost

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Designers and Manufacturers of Forged Steel Fittings, Wire Rope Shears, Hand Pumps, Jacks, Pipe Benders and Hydraulic Equipment

Emsco presents the new MA series Traveling Blocks

OUTSTANDING FEATURES:

- ***Low Center of Gravity***
- ***One-Piece Forged Steel Sheave Rims***
- ***Large Diameter Roller Bearings***
- ***Large Diameter Sheaves***
- ***Slim-Lined Design***

The new slim-lined MA Series Traveling Blocks represent a major advancement among high-capacity, heavy-duty blocks.

The low center of gravity of the MA-60 and MA-50 assures a smooth-operating, fast-falling and straight-traveling block.

Other features of these big blocks include: **(1)** slim-lining to provide better working conditions in the derrick. **(2)** Streamlining for added safety. **(3)** Large diameter sheaves to increase wire line life. **(4)** Large diameter roller bearings that make possible a high capacity, fast-falling block.

Matching MA Series Crown Blocks are available with the new MA-60 and MA-50 Traveling Blocks.

Call CONTINENTAL for information about Emsco's complete line of traveling blocks designed to meet any drilling requirement.

SAFER, LONGER-WEARING SHEAVES

The sheaves of the new MA Series Traveling Blocks are fabricated with one-piece, forged steel rims having uniform grain structure and greater strength. Flame-hardening of the sheave grooves increases their resistance to damage and wear. The combination of forged steel rims, flame-hardened grooves, large diameter sheaves and large diameter roller bearings — positioned close to the sheave grooves — assures the longest possible wire line and sheave life.

EMSCO DERRICK & EQUIPMENT COMPANY
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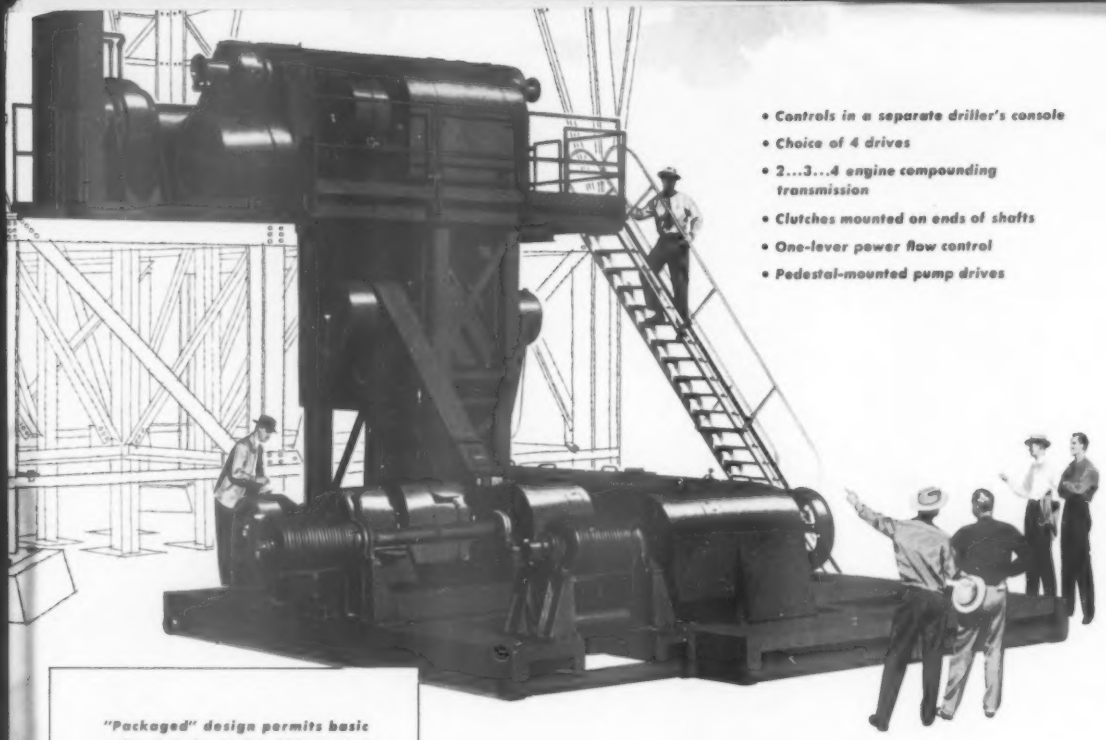
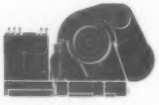
E-119-F-52



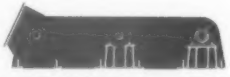
- *Controls in a separate driller's console*
- *Choice of 4 drives*
- *2...3...4 engine compounding transmission*
- *Clutches mounted on ends of shafts*
- *One-lever power flow control*
- *Pedestal-mounted pump drives*

"Packaged" design permits basic units of J rigs to be skid-mounted and packaged separately in 8-foot roadable widths:



DRAWWORKS

SELECTIVE SPEED TRANSMISSION



COMPOUNDING TRANSMISSION

SAND REEL (OPTIONAL)

Your most flexible big rig

Something new in flexibility... portability... and drilling economy are offered in Emsco's two new big rigs—the J-1100 and J-1400. They are built for deep drilling and are identical, except for size.

The "packaged" design of the J-1100 and J-1400 permits a set up to meet any drilling requirement. The key to this versatility is a separate selective speed transmission. It enables the operator to place the engines and compounding transmission at derrick floor height, ground level or at any intermediate position. And, it makes it possible to eliminate or greatly reduce the cost of engine sub-bases, and to entirely eliminate long drawworks and pump drives.

The J-1100 and J-1400 are offered with a choice of four drives: *mechanical, fluid coupling, electric coupling* or *torque converter.*

For easier operation, controls are brought into a separate console at the driller's position. And, where desired, auxiliary equipment may be driven from the compounding transmission.

The "packaged" design and many exclusive features of the J-1100 and J-1400 make them the safest... most efficient... and dependable power rigs yet developed for deep drilling.

Call CONTINENTAL for details about these new BIG rigs!

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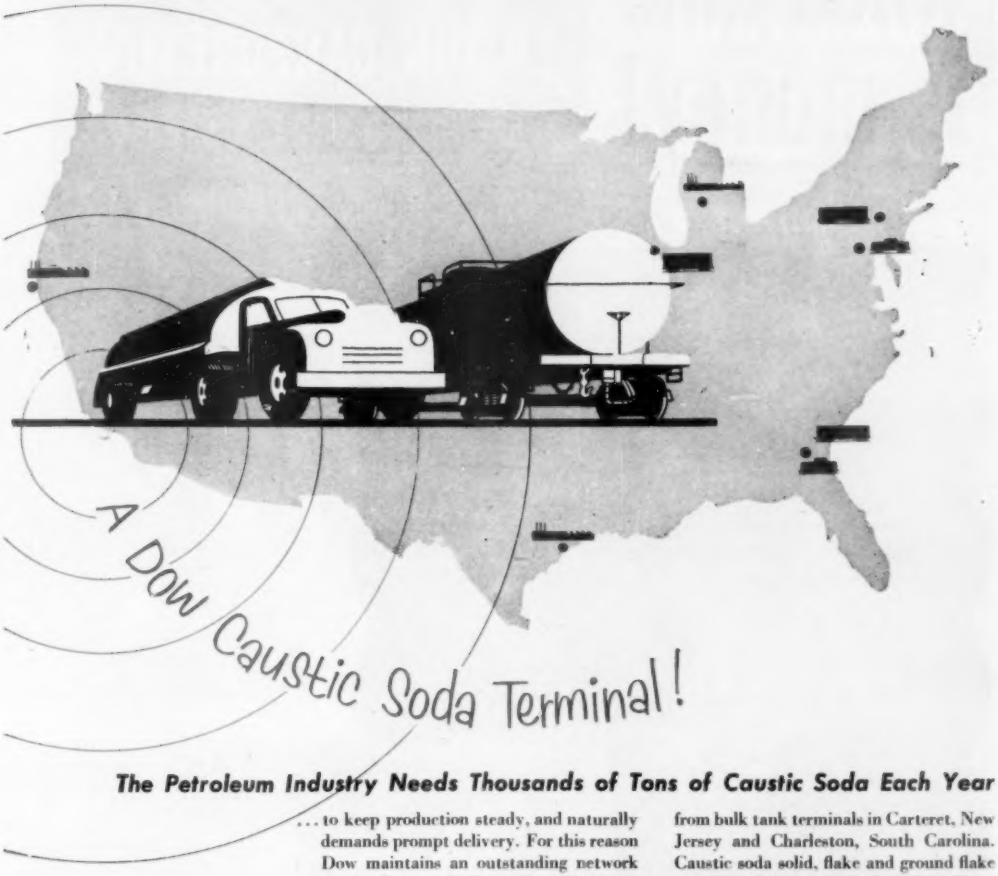
how close are you to Los Angeles, California?



The Petroleum Industry Needs Thousands of Tons of Caustic Soda Each Year

. . . to keep production steady, and naturally demands prompt delivery. For this reason Dow maintains an outstanding network of distribution facilities. In addition to Dow's caustic soda solution terminal in Los Angeles, California—Dow operates caustic soda plants in Midland, Michigan; Freeport, Texas and Pittsburg, California. Dow caustic soda solution is also shipped from bulk tank terminals in Carteret, New Jersey and Charleston, South Carolina. Caustic soda solid, flake and ground flake are shipped from terminals in Port Newark, New Jersey; Chicago, Illinois and Charleston, South Carolina. All of these distribution points play an important part in providing the petroleum industry with the superior service it requires.

wherever you are... *you're close to*

DOW CAUSTIC SODA

THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN

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DOW

CHEMICALS

INDISPENSABLE TO INDUSTRY AND AGRICULTURE

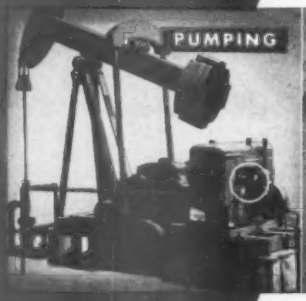
when time is money!

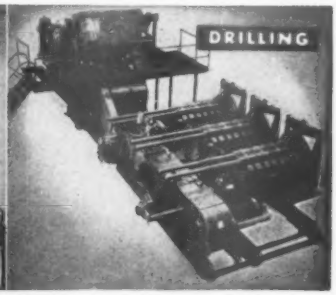
Drillers and production men look to

ENSIGN CARBURETION

for DEPENDABLE low cost

GAS ENGINE PERFORMANCE





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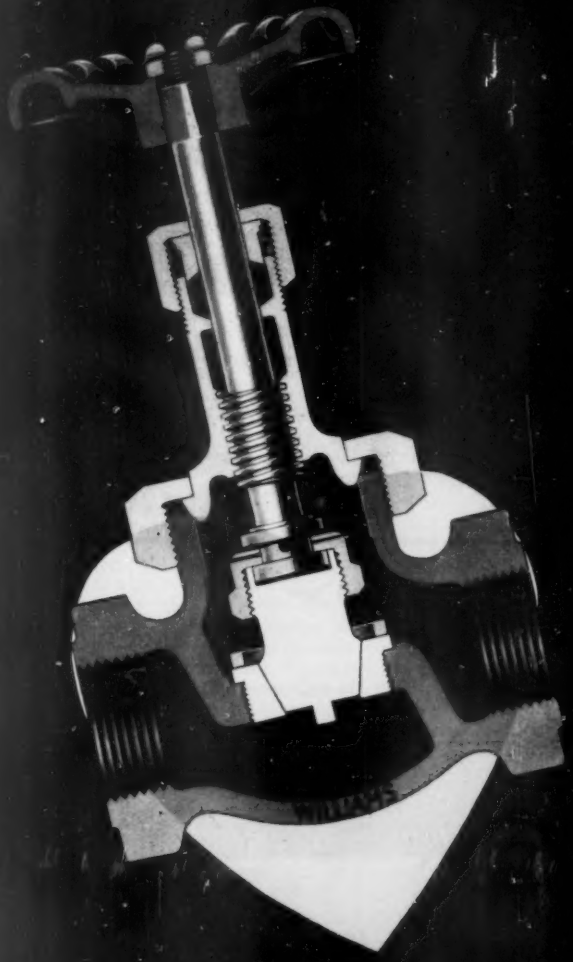
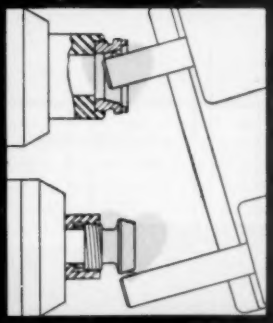
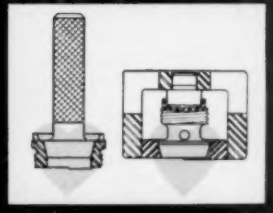


THERE'S ACCURACY IN THE HEART OF EVERY D. T. WILLIAMS VALVE

Assured by simultaneous machining of disc and seat ring . . .



then precision gauge inspection!



See your nearest jobber or write for literature

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THE D. T. WILLIAMS VALVE CO.
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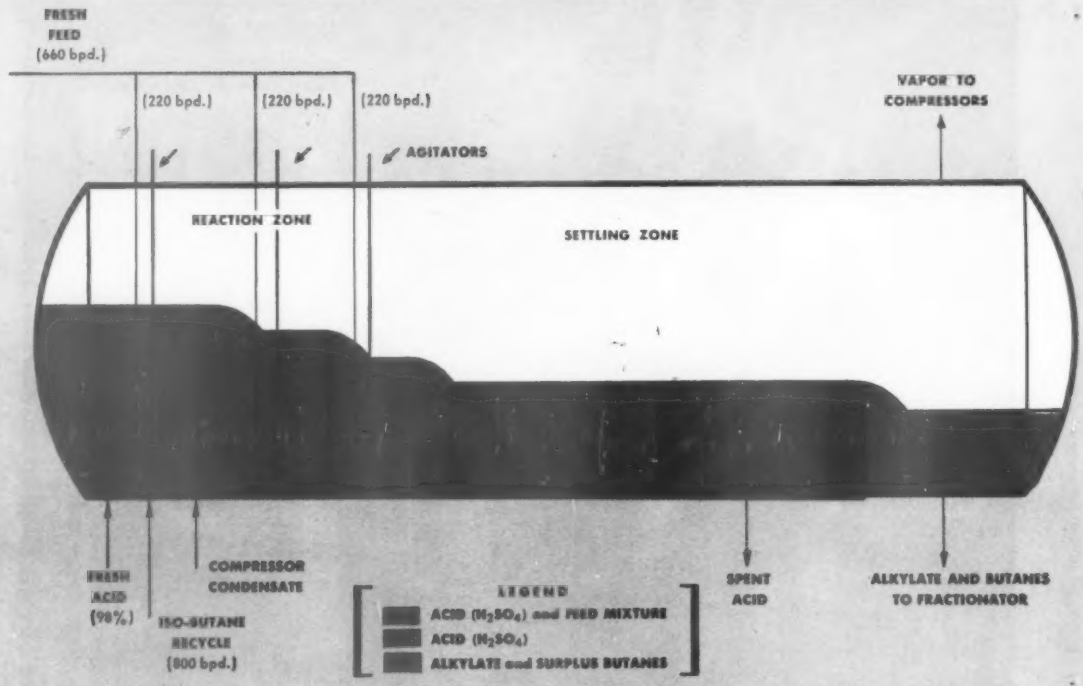
This NEW Kellogg-cascade reactor initial cost



How New Reactor Maintains 9-to-1 Isobutane-Butylene Ratio

Assume, as a simplified case, that fresh feed is charged to the reactor shown here at 660 barrels per day. This feed, comprising a mixture of approximately 300 barrels of butylene and 360 barrels of isobutane, is divided into three equal 220 BPD portions, each of which is introduced into one of the three reaction sections.

To increase the amount of isobutane at the points of reaction, a recycle stream of isobutane from the unit's main fractionator is fed in at the bottom of the first section. This recycle must be at a rate of 800 BPD to provide the desired isobutane-butylene ratio.

Adding up the total amount of isobutane in the first reaction section, we find there are 920 barrels to 100 barrels of olefin. Since only about 110 barrels of the isobutane reacts with the total olefin present, about 810 barrels of excess isobutane are carried over into the second section where the cycle starts over again.

Thus, while the total amount of olefin charged each day to this reactor is 300 barrels and the total amount of isobutane is 1160 barrels (a ratio of about four-to-one), the actual ratio at all reaction points is better than *nine-to-one*.

designed brings lower to sulphuric acid Alkylation...

SULPHURIC ACID alkylation has long been recognized as a vital process in the production of high octane avgas and a valuable tool for upgrading a refinery's motor gasoline pool.

Now several Kellogg design innovations have been incorporated in this process which reduce the initial investment required, as well as the daily operating costs, for the production of a given quality and quantity of alkylate.

The most important improvements have been made in the reactor itself. With the new Kellogg cascade reactor, a highly desirable nine-to-one ratio of isobutane to butylene is maintained *in the reaction zones*—although the overall isobutane *feed* to the reactor is less than four-to-one. While increasing the yield and improving the quality of alkylate, this new design also materially reduces the number of pumps and permits use of smaller vessels than would otherwise be required to attain a high isobutane-butylene ratio.

In addition, the cascade flow of acid and fresh feed in successive stages radically improves the economics of acid consumption. When feeding 98% sulphuric acid to the new Kellogg units, the acid concentration can be maintained at an efficient average of 91.5% in all reaction zones, while the withdrawal concentration is kept at a low 88%.

Add to these advantages the low horsepower requirements of propeller-type agitation and the savings inherent in auto refrigeration cooling . . . and it is evident why many refiners are exploring the possibilities of modern sulphuric acid alkylation.

New Kellogg-Designed Units

UNITS OPERATING

In the Midwest—2500 BPD unit
In the Southwest—1000 BPD unit
On the Atlantic Seaboard—2200 BPD unit

UNITS UNDER CONSTRUCTION

In Texas—1200 BPD unit
In South America—1600 BPD unit

UNITS IN ENGINEERING

On the Atlantic Seaboard—3500 BPD unit
In Texas—1200 BPD unit

For further information, yield and inspection data, etc. write

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for fifty one years an integral part of petroleum refining progress!

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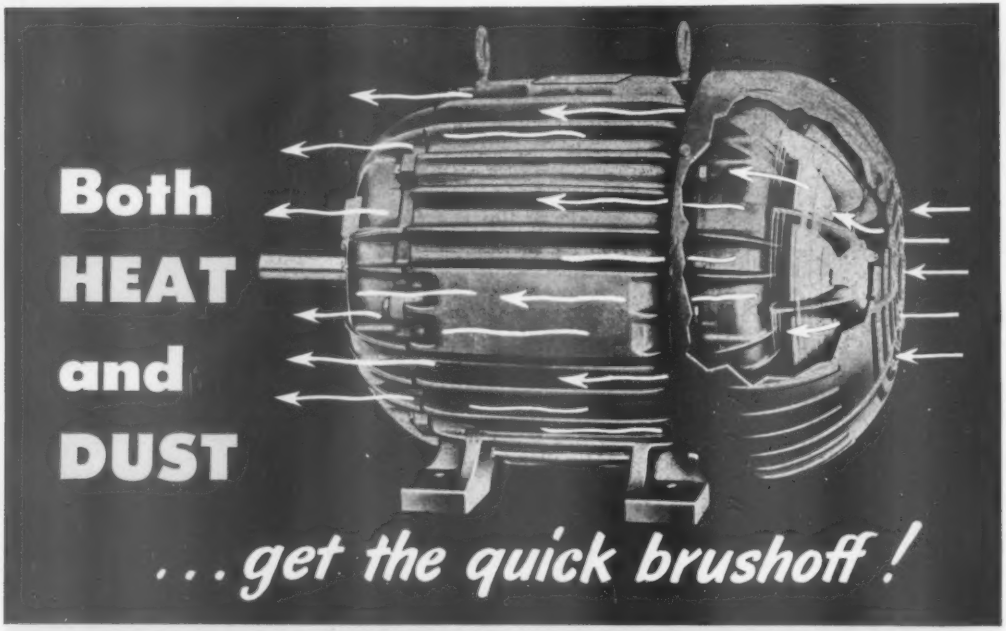
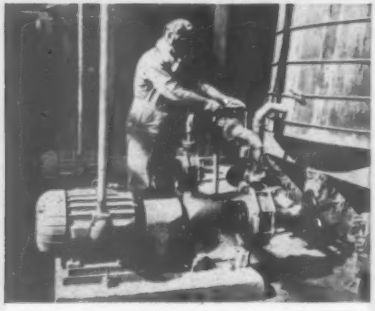


ELLIOTT CROCKER-WHEELER

Sealedpower MOTOR



WHERE EVEN THE AIR HAS TEETH

containing fumes so corrosive that in this chemical plant the operator turning the valve must wear rubber gloves and a face-mask. The two *Sealedpower* motors wear just their totally enclosing jacket, and keep cool and clean with no trouble. This sort of thing is all in the day's work for *Sealedpower* motors.

"Keep moving" says the cowl-directed air blast to heat, dust and dirt, as it sweeps along the radiating fins of the motor's outer case. This totally-enclosed fan-cooled *Sealedpower* motor, with its eleven-year service record, has worked in so many tough spots that its ability to take the worst you can hand it is proven beyond question. Its name, *Sealedpower*, means what it says—power that's sealed in, immune to outside conditions, with the plus factor of radiating fins and the air blast to take away heat and prevent dust from settling. *Capacities 3 to 125 hp. Also explosion-proof, underwriters approved, in most ratings. Bulletin on request.*

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on a Lufkin

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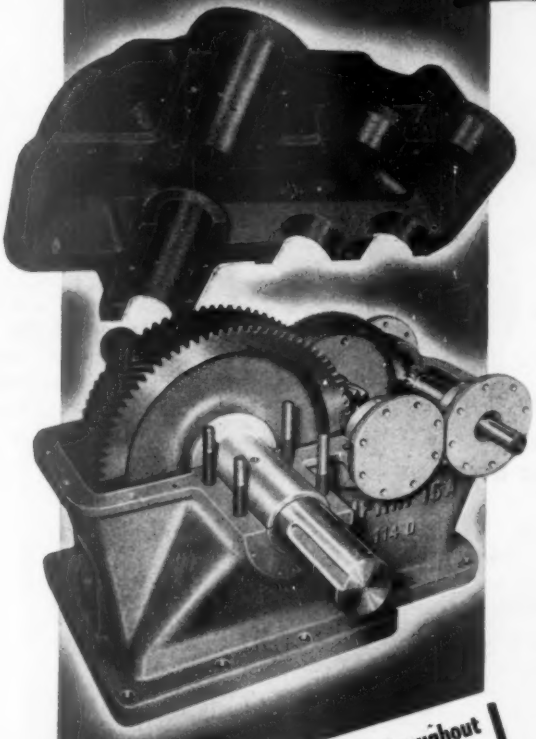

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- Large Clean Out Hole for removing sludge from bottom of box.

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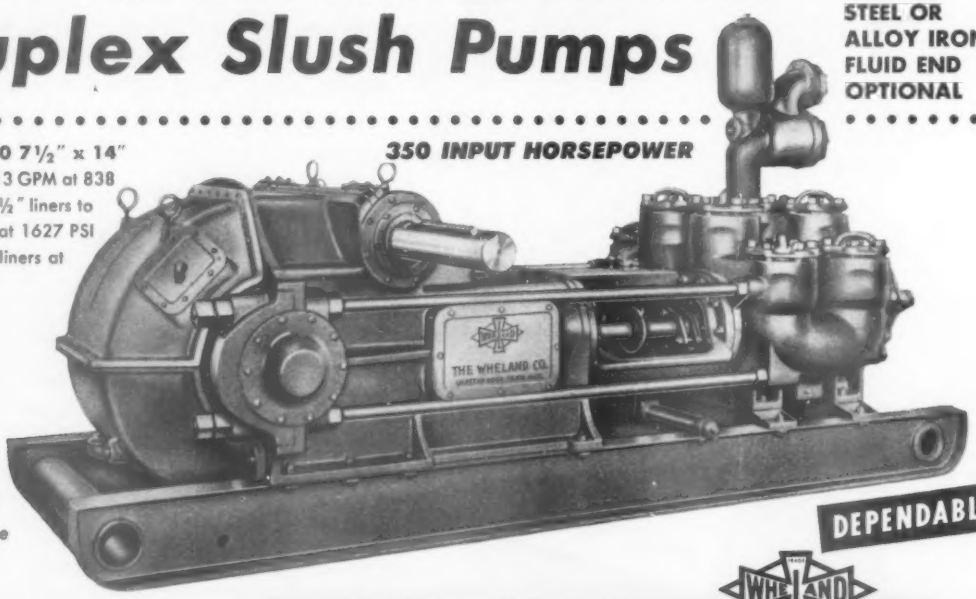
350 INPUT HORSEPOWER



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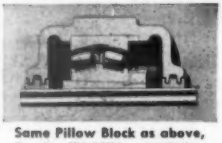
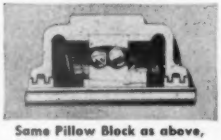
"Free" Spherical Roller Bearing.



Same Pillow Block as above, Bearing "Held" by stabilizing ring.

"Free" Ball Bearing.



Same Pillow Block as above, Bearing "Held" by stabilizing ring.

Here's *why* the Series SAF Pillow Block is SKF's answer to your problems:

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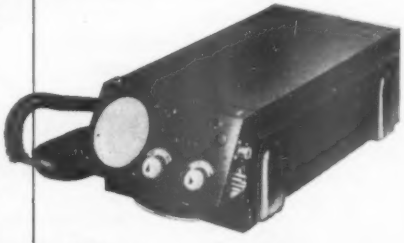

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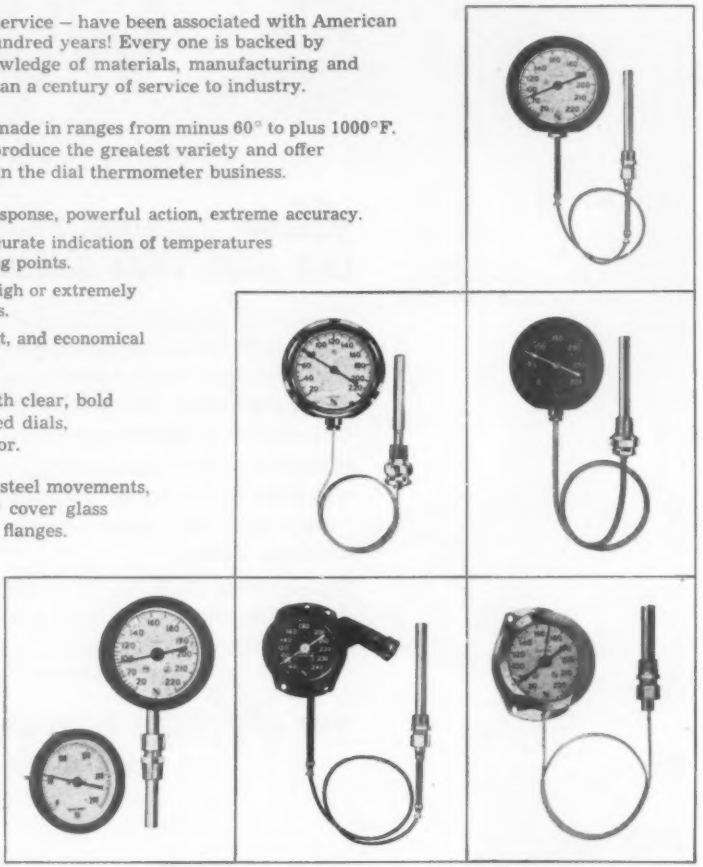

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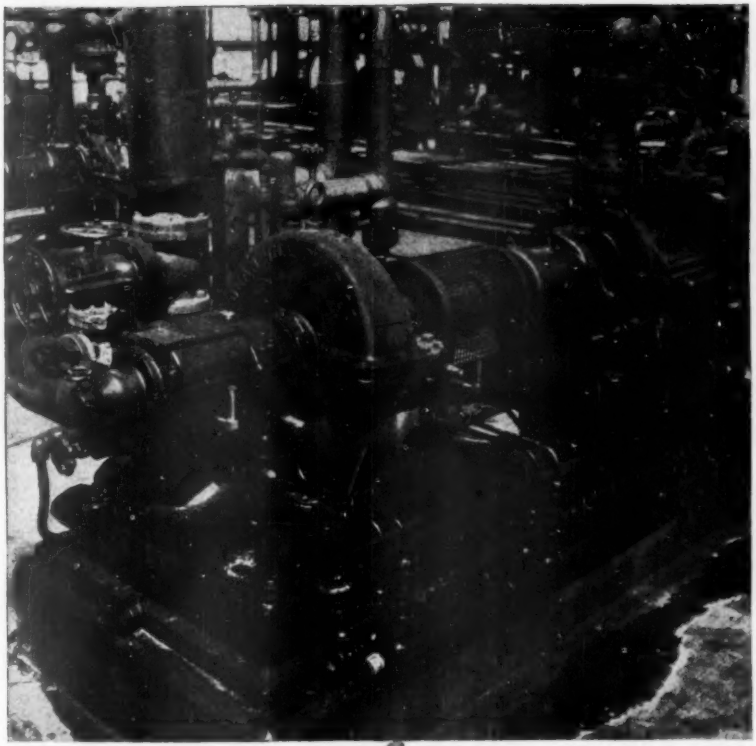

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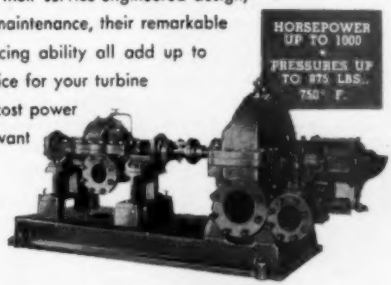

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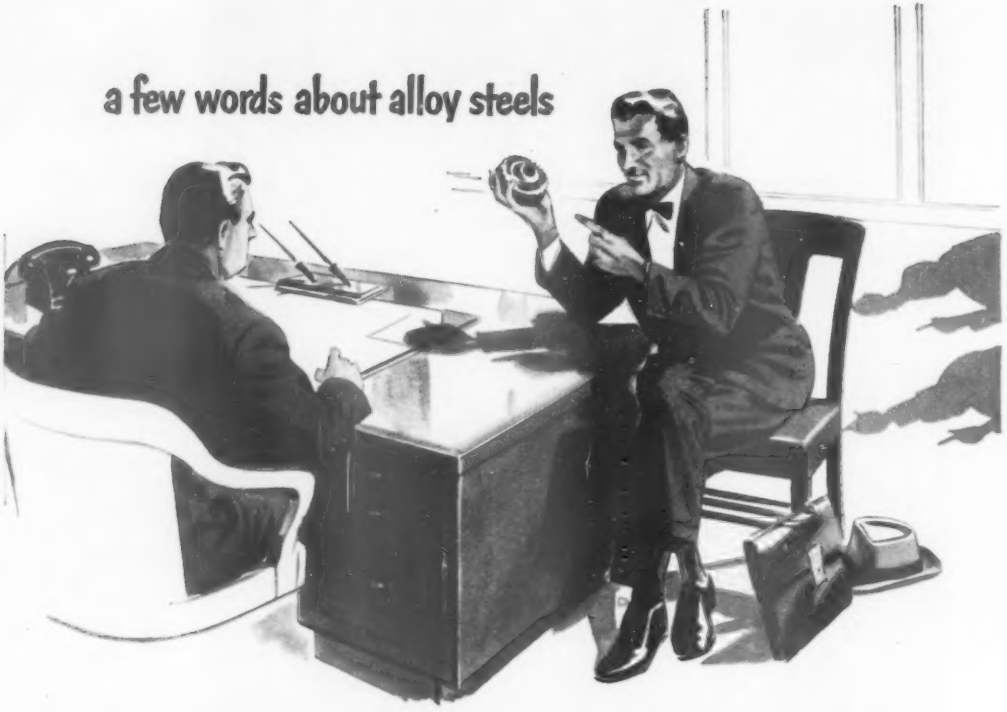
a few words about alloy steels



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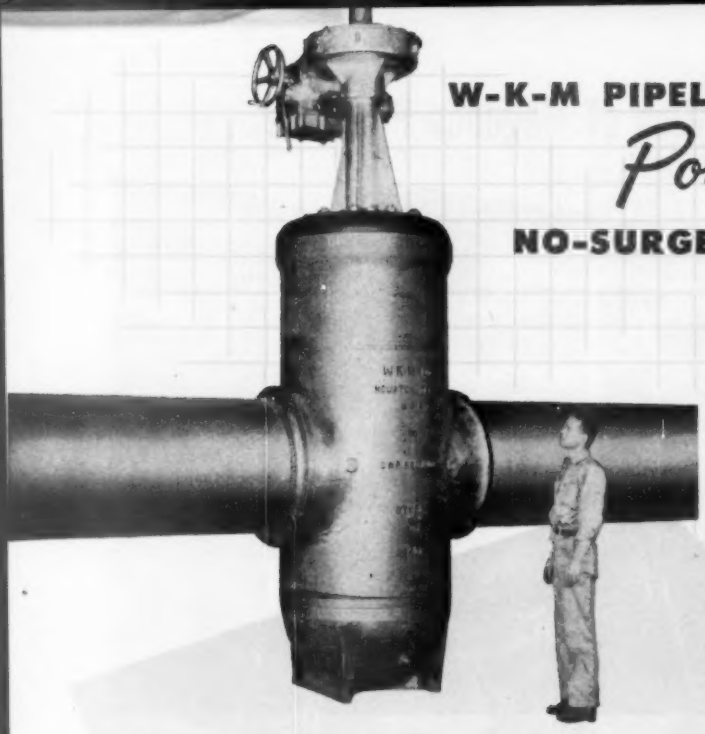

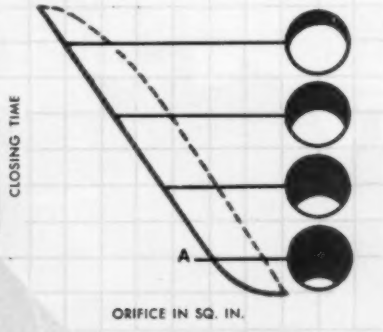

Dotted line shows closing curve of conventional gate valve.

W-K-M Pipeline Valves may be closed as fast as required without setting up dangerous line surges.

There is no need to "baby" W-K-M Valves with partial hand operation or two-speed motor operators because they may be closed at a ***rapid constant speed, yet give the necessary gradual close off at the critical point to prevent surging.***

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Specify W-K-M for surge-free closing as well as the many other advantages which have been proved and tested on the world's leading pipelines.

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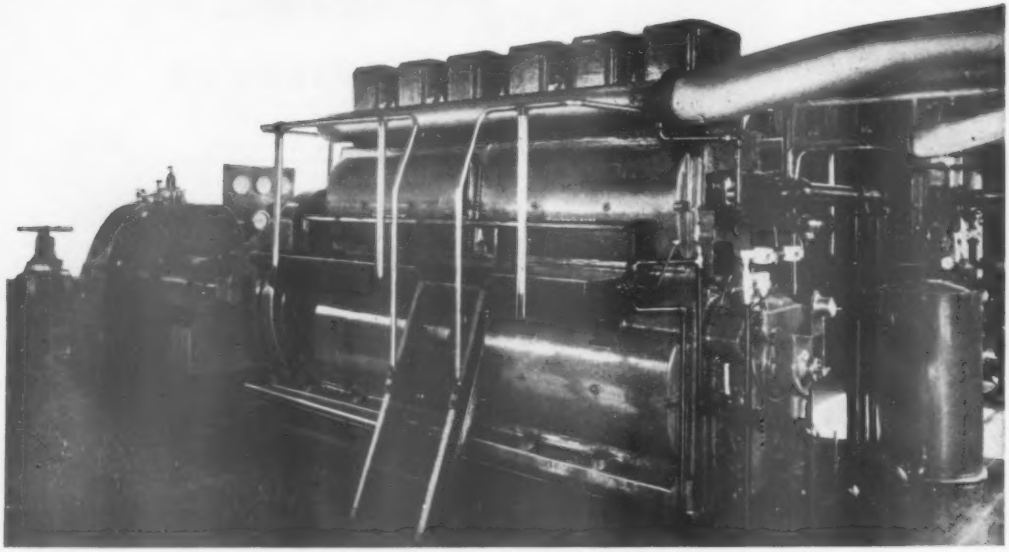
W-K-M *Valves*

MOST OF THE WORLD'S NEWEST PIPELINES ARE TIED TOGETHER WITH W-K-M VALVES

at the Anthony Station of Magnolia Pipe Line . . .



89.6% of elapsed time

for 11 years . . . that's Alco dependability

On-the-job performance—the toughest test of all shows what Alco Standardized Diesels can do. Two of these engines installed at the Anthony Station of the Magnolia Pipe Line have each rolled up over 90,000 hours of operation since installation. They have run as much as 94.9% of the elapsed time in a single year.

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- **Higher engine efficiency** for lower fuel costs
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In the last ten years *more Alco Diesel Engines have been installed in oil pipe line pumping service in the United States and Canada, than any others.* To find out how they can help you, contact your nearest American Locomotive Company Sales Office at Beaumont, Chicago, Cleveland, Houston, Kansas City, New York, San Francisco, Schenectady or St. Louis.

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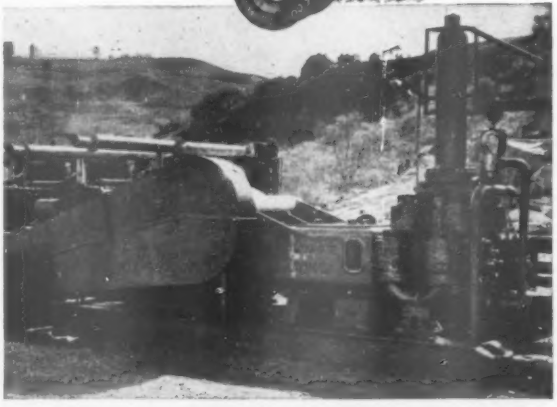
It's easy to get the genuine Gardner-Denver parts you need. Branch offices, stores and agents are located in all oil fields throughout the world. Factory-trained servicemen are readily available to help you install Gardner-Denver parts.



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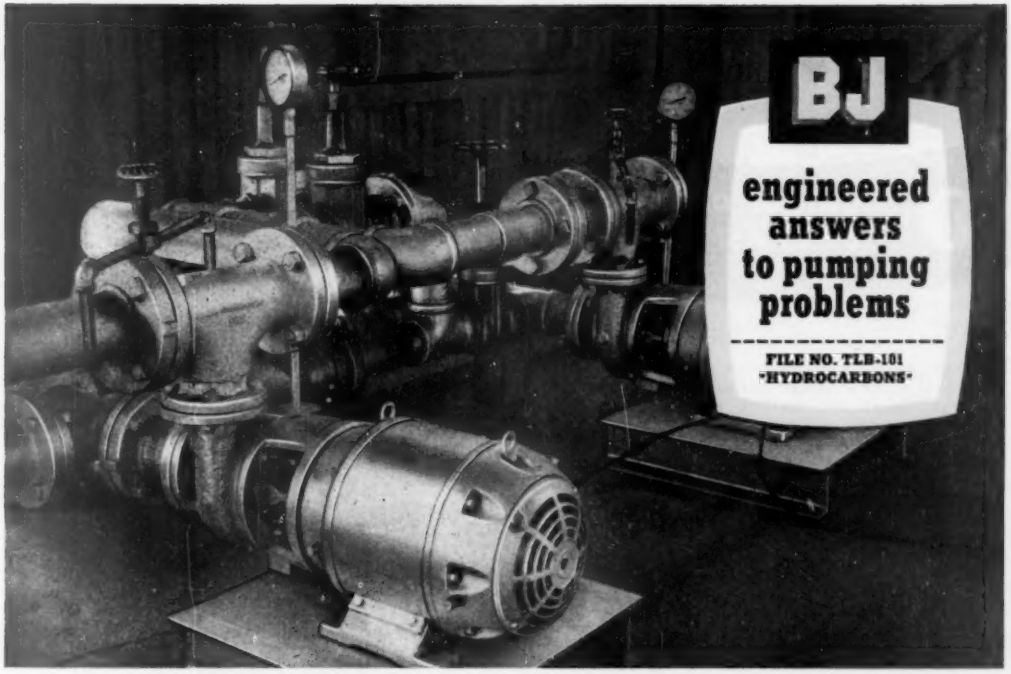
Continental Supply Co., Continental Bldg., Dallas, Texas
Export Division: 30 Rockefeller Plaza, New York, N. Y.
Republic Supply Co., (Of Calif.), 2600 S. Eastland Ave., Los Angeles, Calif.

THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS



General Petroleum reports:

Mechanically-sealed BJ Type TLB Pumps handle hydrocarbons without leakage, fire hazard, repacking problems or special operating attention

BYRON JACKSON ENGINEERS developed the TLB pump to solve the leakage, fire hazard and repacking problems faced in the handling of hydrocarbons. Formerly, the only pumps which met these requirements represented a considerable investment in cost and installation. Now, the BJ Type TLB offers a sensibly-priced unit, easily installed and operated with a minimum of attention. It features a simple, efficient BJ Mechanical Seal which replaces the packing in the stuffingbox and provides a reliable safeguard against leakage.

The installation shown above is at General Petroleum's Bakersfield Bulk Plant. Two BJ Type TLB Pumps are used here for loading gasoline and diesel fuels, pumping 160 gpm against 62 ft. total head. Explosion-proof 3 hp, 3-phase, 60 cycle, 220/440 v motors operate at 3550 rpm.

For the engineered answer to *your* standard or special pumping needs contact your local BJ sales office or write direct. For more information on these TLB Pumps—including pump selection table and friction compensation charts—send the coupon below.

FILE FACTS:

- Unitized design simplifies installation—needs no base plate—saves space—mounts at any angle.
- No packing to maintain.
- BJ Mechanical Seal cooled by pumped liquid.
- Single-stage, single-suction pump sizes from 1¼" to 4".
- Close-coupled construction allows more efficient application of power to pump.
- Capacities to 1000 gpm. Heads to 200 ft.
- Discharge pressure: 75 psi.
- Max. working temperatures: 150°F.
- Explosion-proof motors.

Byron Jackson Co.
Since 1872
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Please send me your TLB Bulletin No. 50-9200

Name_____

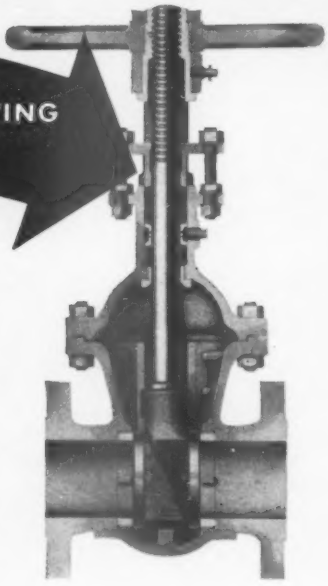
Company_____

Address_____

City_____ Zone____ State_____

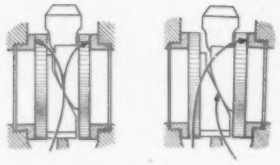
2 WAYS TO GET BETTER VALVE SERVICE!

1 ...UNIQUE DARLING DOUBLE REVOLVING DISC, CAST STEEL GATE VALVE



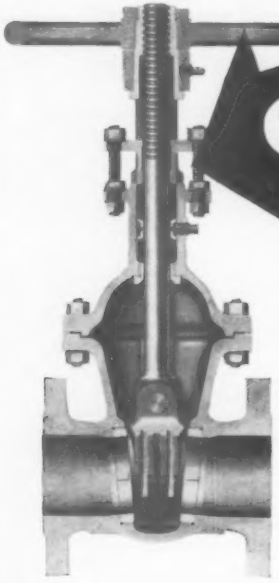
YES, here's a sure way to get better, more dependable valve service. Install this Darling gate valve of the fully revolving double disc, parallel seat type. Time after time users rate it number one for the elimination of down-time and repeated maintenance headaches.

Check the diagrams at right. Note how this Darling gate valve automatically compensates for body distortion, and resulting misalignment of seats. The upper wedge face is radiused, while the lower wedge face is straight, thus disc-to-seat pressure is equalized, assuring tight closure despite distortion and wear.



Discs and seats are parallel. *Seats forced out of parallel by body distortion but discs adapt themselves to give positive closure.* *Radiused face of wedge allows discs to adjust tightly against both seats.*

For foolproof simplicity in maintenance and reassembly, and unequalled service life, install this superior Darling Cast Steel Gate Valve.



2 ...DARLING SLOTTED WEDGE CAST STEEL GATE VALVE

HERE'S the second good way to get better valve service. This Darling gate valve's slotted wedge provides *flexibility* when it's needed! It automatically compensates for expansion and contraction due to temperature changes, avoids leaks and minimizes wear and tear on the wedge faces and seats.

What's more, the wedge has *double* guide grooves which engage twin ribs in the valve body. This provides twice the usual bearing area, assuring smooth trouble-free alignment every time!

FOR PLUS VALUES, JOB-PROVED AGAIN AND AGAIN

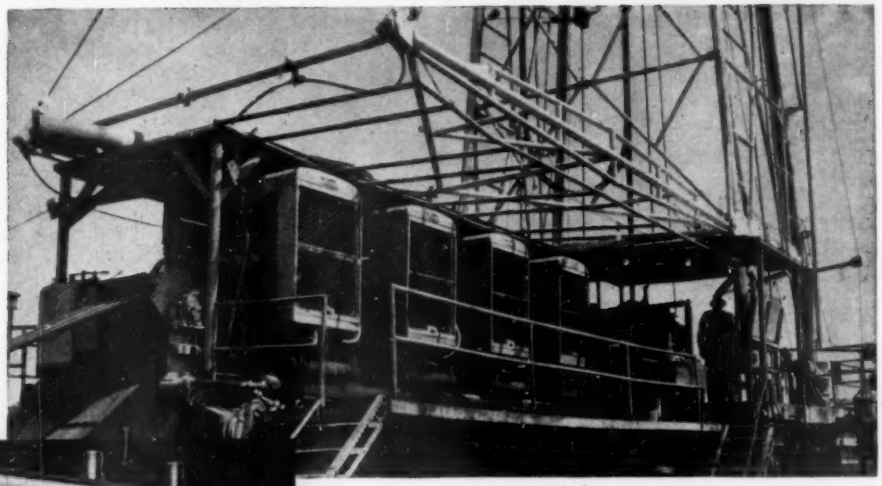
EVERY NEED. *Darling gate valves are made in a wide range of sizes, types and constructions for all kinds of normal and unusual service... and for pressures up to 1500 pounds.*

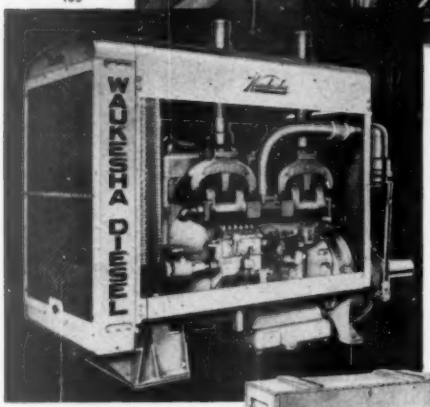
DARLING VALVE & MANUFACTURING CO.

Williamsport 1, Pa.

Manufactured in Canada by Sandilands Valve Manufacturing Co., Ltd., Galt 19, Ontario

this rig has drilled 195,500 FEET...





6-WAKD WAUKESHA Diesel Unit, 6-cylinders, 6¼-in. x 6½-in., 1197 cu. in. displacement.

•

WAKD Conversion Kits contain special cylinder heads for gas fuel, top cylinder oilers, a complete gas fuel system, complete ignition system, and accessories. Write for details.

with

WAUKESHA *Diesel-Gas* CONVERSION UNITS

Mr. David Crow of the Crow Drilling Co., Shreveport, La., had his No. 16 drilling rig, a Model N-10 *Brewster,* built to his special specifications which particularly call for Waukesha Power. It has four Waukesha 6-WAKDG Diesel-Gas Conversion Oil Field Power Units.

They also drive the two *Oilwell* No. 214-P mud pumps. Already Mr. Crow has drilled 23 wells, varying from 7000 to 10,000 ft., with this rig—a total footage of 195,500 ft. It is now making hole in Louisiana, across the river from Orange, Texas.

The basic features contributing to the rugged, long life of Waukesha Diesels are unchanged, but the conversions are true gas engines.

WAUKESHA MOTOR COMPANY, WAUKESHA, WIS., NEW YORK • TULSA • LOS ANGELES

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Diesel OIL FIELD POWER *Gas*

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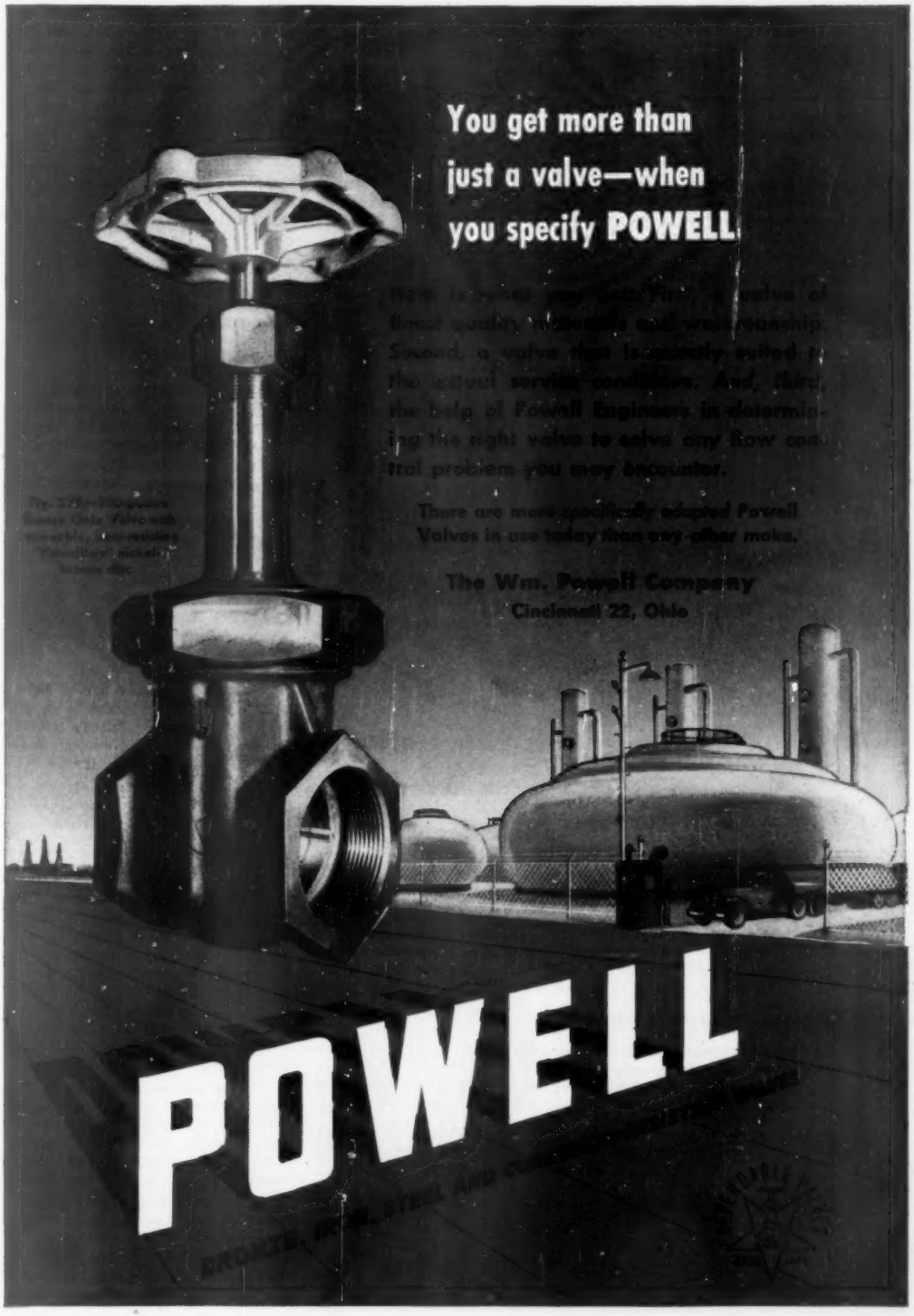
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Valves in use today than any other make.
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POWELL

They Say—

Socialistic Synthetics

"Interior Secretary Chapman has sent a report to the absent congress urging a private industry to invest a billion dollars or more in plants to make gasoline and other fuels from coal or oil shales. Eventually, he asserted, the country will have to depend in part on these synthetic fuels.

"Mr. Chapman is a socialist at heart. He knows his plea to private industry is unlikely to meet response. Then, in the name of conserving national resources he may be depended upon to urge that the Government undertake the task.

"Every big petroleum refining company has been working for years on synthetic fuels. Processes are tested and well understood. They helped sustain Germany during two world wars. The only trouble with them is that they cost too much.

"If the day ever comes when petroleum reserves are seriously depleted, the oil companies will start building coal or oil shale plants to make synthetic fuel. They will not build such plants so long as there is a sufficient supply of petroleum, and they would be defrauding their customers if they did, because everyone would have to pay more for gasoline to defray the higher cost of the synthetic fuels.

"There is no need for these plants yet, and if Mr. Chapman were to build them, he would only be defrauding the taxpayers, using their money to subsidize an uneconomic industrial process."

Editorial in the Chicago Daily Tribune.

Early Fill-ups Urged

"Every gallon of fuel oil we can get into storage before the winter, is a gallon that won't be putting a strain on transportation during the winter, and that could be tremendously important in the heating season ahead.

"I do not feel that it is safe to plan operations upon the assumption that you are going to have another mild winter."

Lawrence W. Lee, director of marketing and distribution, Petroleum Administration for Defense, addressing the National Oil Jobbers Council, Traverse City, Mich.

Iran's Dead Horse

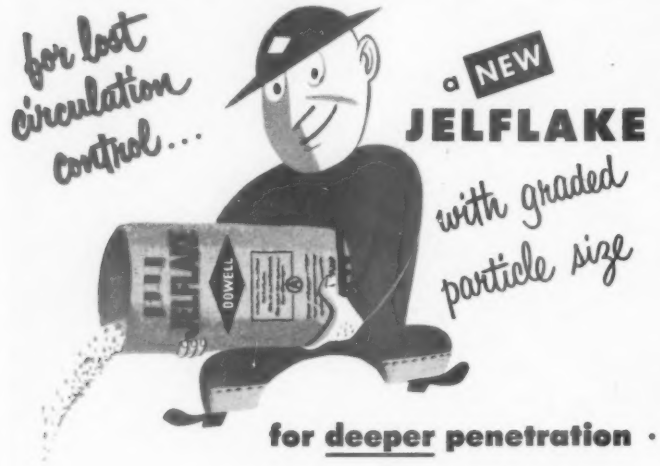
"Without doubt the ruling of the International Court of Justice in the Anglo-Iranian oil dispute has strengthened the hand of Premier Mossadegh in the purely legal aspects of the matter.

"In no way, however, does the decision alter the economic aspects of the controversy which have become radically different from what they were a year ago. What matters now is not whether there was a legal or moral basis for the act of seizure but whether a market exists any longer for the oil that Iran is capable of producing.

"The International Court at The Hague did not attempt to judge the Iranian oil seizure on the basis of whether it was right or wrong. The court was concerned only with its competence to sit in judgment of the dispute, ruling finally that it was without authority.

"On the strength of that ruling Premier Mossadegh now is inviting the British to present their claims to the Iranian courts, an invitation that appears equivalent to asking the British to accept a settlement on Iran's terms.

"Such a settlement might be indicated if the need for Iran's oil had continued as pressing as it was a year ago. That is not the case, however, and Mossadegh may be as far away as ever from restoring production and recapturing the oil



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New Jelflake offers irregularly shaped particles graded from pin point size up to 2 inches in length. This makes it possible for the smaller particles to be forced into the formation and the larger pieces then to plaster over and plug the walls of the hole.

pound for pound . . . A BETTER BUY!

The average thickness of Jelflake is only 1/1000 of an inch which means coverage of approximately half a million square inches per bag . . . more value per dollar. Jelflake filters out of mud or slurry onto formation walls to seal off "thief" zones—saving costly losses.

Jelflake is sold everywhere in strong, wet-proof 25 pound bags. Ask your nearest mud distributor, supply store or Dowell Station for quick delivery. *Use Jelflake and get maximum surface coverage!*

Keep **JELFLAKE** Handy — DOWELL

revenues his country needs so desperately."

Editorial in the Daily Oklahoman.

Silence on the Tidelands

"The Democratic platform makers faced one issue which simply did not lend itself to straddling, no matter how well disguised. It was the issue of ownership of the tidelands, a major issue in these years.

"The party pretends to be that state rights party, and the tidelands question is a pure case of state rights threatened by federal avarice.

"The Republican party, in its recent convention, had advocated state ownership, an added reason for expecting the Democratic party would similarly uphold state rights.

"However, there existed a compelling reason against a plank demanding state ownership. This was the record of the Truman administration.

"It was the present Democratic administration which went into the Supreme Court to castigate the states for claiming the tidelands they had always possessed, and it was the present administration that went beyond the Constitution, into the hazy vapors of left-wing philosophy, to find arguments justifying federal seizure.

"The free-and-easy thinkers of these times, who are willing to accept anything for the sake of expediency, may convince themselves that this flight from an issue was excusable. They are wrong. It was shameful cowardice on the part of the platform makers; and the adoption of the platform, almost without a dissenting voice, reflects the same attributes in the convention itself."

Editorial in the Shreveport Times.

CALENDAR

AUG.

19-22 American Institute of Electrical Engineers, Pacific general meeting, Westward Ho Hotel, Phoenix, Ariz.

25-27 Twelfth Annual Appalachian Gas Measurement Short Course, West Virginia University, Morgantown, W. Va.

SEPT.

1- 3 Interstate Oil Compact Commission, fall meeting, Banff, Canada.

1- 5 International Symposium on Combustion, Massachusetts Institute of Technology, Boston.

3- 5 Pacific Coast Gas Association, Ambassador Hotel, Los Angeles.

4- 5 Rocky Mountain Oil & Gas Association, refining committee, Newhouse Hotel, Salt Lake City.

8-12 Instrument Society of America, seventh national instrument conference and exhibit, Cleveland.

10-12 National Petroleum Association, fiftieth annual meeting, Hotel Traymore, Atlantic City, N. J.

11-13 American Institute of Chemical Engineers, regional meeting, Palmer House, Chicago.

12-13 Association of Desk and Derrick Clubs of North America, first annual meeting, Shamrock Hotel, Houston.

13 Seventh National Chemical Exposition, Chicago Coliseum.

24-25 Independent Petroleum Association of America, annual meeting, Skirvin Hotel, Oklahoma City.

25-26 Western Petroleum Refiners Association, regional meeting, Hotel Henning, Casper, Wyo.

29-30 American Association of Oilwell Drilling Contractors, annual meeting, Skirvin Hotel, Oklahoma City.

OCT.

1- 3 American Institute of Mining and Metallurgical Engineers, Mid-Continent fall meeting, Rice Hotel, Houston.

1- 3 National Association of Corrosion Engineers, South Central Region, technical program and committee meetings, Jung Hotel, New Orleans.

2- 3 Petroleum Electric Power Association, twenty-third annual meeting, Mayo Hotel, Tulsa.

3- 5 New Mexico Geological Society, annual field conference, Santa Fe.

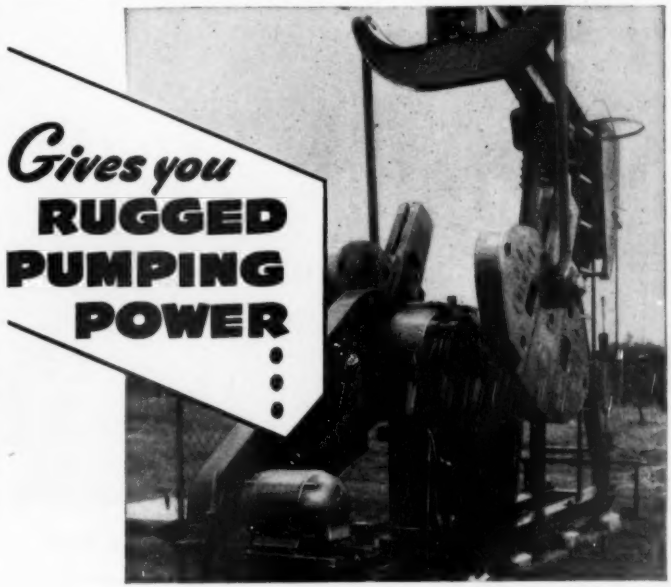
4 John Zink Process Heating seminar, John Zink Co. plant, Tulsa.

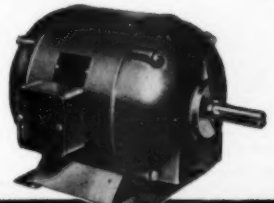
6 Independent Natural Gas Association of America, annual meeting, Fontenelle Hotel, Omaha, Neb.

9-10 California Natural Gasoline Association, twenty-seventh annual fall meeting, Ambassador Hotel, Los Angeles.

13-15 Texas Mid-Continent Oil and Gas Association, thirty-third annual meeting, Hotel Texas, Fort Worth.

13-17 American Institute of Electrical Engineers, fall meeting, New Orleans.





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Also available at slight additional cost: High Slip and High Torque Motors; Triple-Rated Motors to meet changing horsepower requirements without changing motors—save power costs.

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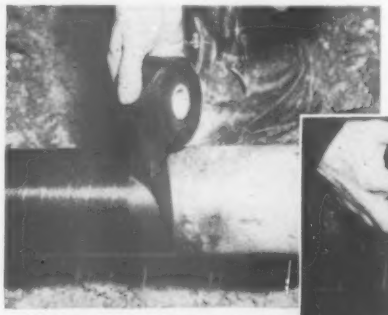

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16-17 Western Petroleum Refiners Association, regional meeting, Garrett Hotel, El Dorado, Ark.
16-19 Permian Basin Oil Show, Odessa, Tex.
19 Natural Gasoline Association of America, southern regional meeting, Blackstone Hotel, Tyler, Tex.
22-24 Society of Automotive Engineers, national transportation meeting, Hotel William Penn, Pittsburgh, Pa.
22-24 American Institute of Mining and Metallurgical Engineers, West Coast fall meeting, petroleum branch, Statler Hotel, Los Angeles.
23-24 American Institute of Mining and Metallurgical Engineers, West Coast fall meeting, Statler Hotel, Los Angeles.
23-24 Independent Petroleum Association of America, annual membership meeting, Skirvin Hotel, Oklahoma City.
27-31 American Gas Association, annual convention, Atlantic City, N. J.
30-31 American Association of Petroleum Geologists, Society of Exploration Geophysicists, and Society of Economic Paleontologists and Mineralogists, annual fall meeting of Pacific sections, Statler Hotel, Los Angeles.
30-Nov. 1 Rocky Mountain Oil and Gas Association, annual meeting, Cosmopolitan Hotel, Denver.

NOV.

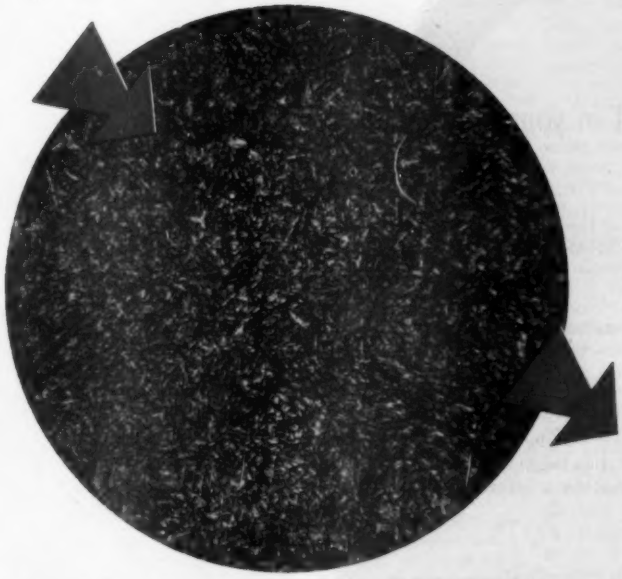
3- 4 Society of Automotive Engineers, national diesel engine meeting, Chase Hotel, (tentative), St. Louis, Mo.
5- 7 Industrial Management Society, 16th annual time and motion study and management clinic, Sheraton Hotel, Chicago.
6- 7 Society of Automotive Engineers, national fuels and lubricants meeting, Mayo Hotel, Tulsa.
6- 8 Gulf Coast Association of Geological Societies, annual fall meeting, Hotel Driscoll, Corpus Christi, Tex.
8-13 Oil Industry Information Committee, Conrad Hilton Hotel, Chicago.
10-13 American Petroleum Institute, thirty-second annual meeting, Conrad Hilton Hotel and Palmer House, Chicago.
13-14 Society of Exploration Geophysicists, midwestern meeting, Texas Hotel, Fort Worth.
17-18 American Institute of Electrical Engineers, subcommittee on electrically operated recording and controlling instruments, technical conference, Benjamin Franklin Hotel, Philadelphia.
20-22 Instrument Maintenance Short Course, jointly sponsored by Southern California Meter Association and Los Angeles Harbor Junior College.
30-Dec. 5 American Society of Mechanical Engineers, Statler Hotel, New York City.

DEC.

1- 3 New Mexico Oil and Gas Association, annual meeting, Albuquerque.
1- 6 Twentieth National Exposition of Power and Mechanical Engineering Grand Central Palace, New York.
5- 6 Interstate Oil Compact Commission, winter meeting, Wichita, Kans.
7 Natural Gasoline Association of America, Panhandle-Plains regional meeting, Herring Hotel, Amarillo, Tex.
7-10 American Institute of Chemical Engineers, annual meeting, Hotel Cleveland (Hqs.) and Carter Hotel, Cleveland.

Here's another reason why

REED TOOL JOINTS *last longer!*



This photomicrograph of a steel specimen from a **REED** Tool Joint means little to most people—but an internationally famous steel company said, "It is one of the most perfectly heat treated . . . one of the most homogeneously tempered martensitic structures . . ." they had ever seen.

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The steel in your **REED** Tool Joints is just like that, because **REED** "tailors" precision heat treating to each heat of steel instead of using a standard heat treatment based on average analysis.

This "tailored" heat treatment makes **REED** Tool Joints even stronger and more wear resistant. It is another important reason why **REED** TOOL JOINTS LAST LONGER!

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JOURNALLY Speaking

Editorial Plug

THE term "lost circulation" means one thing to a driller and something else again to our circulation manager, but here's a case where one offset the other:

A loyal booster of our favorite oil publication writes that he recently made good (but unorthodox) use of one of our issues. He had read everything in it but had it in his car when he visited a well in Saline County, Kansas.

"The operator had plugged back with gravel," he said, and was attempting to run Cal-Seal plug on top of gravel, but it wouldn't hold. I shredded my copy of The Oil and Gas Journal, mixed the shredded paper with jelly seal, and dumped it on top of the gravel. Then followed with Cal-Seal, and we got a good plug this time. Just wanted you to know that after having read all the good articles in your Journal it was still useful."

Ordinarily we prefer that the magazine be passed on to another reader instead of going out of circulation, but we are glad to help this operator plug off the lost circulation in his well. We like plugs.

The moral of this story is: Never be without a copy of the Big Yellow Book: you never can tell when it may come in handy.

Skirt Gathering

A CONVENTION the like of which the petroleum industry has never seen will be held in Houston's Shamrock Hotel September 12—the first annual convention of the Association of Desk and Derrick Clubs of North America.

It will be a remarkable gathering, from many standpoints. In the first place, it will be composed entirely of women—at least 1,000 of them, to judge from advance registrations already on file—and they will all be oil women.

Unlike every other meeting of this convention - saturated industry, this group will not present any technical papers nor listen to any speeches about the operation and management of the oil business. The ladies will have some fun, but most of the meeting will be devoted to discussion of the business of living in the oil industry.

In still another way this convention is different: The advance publicity goes into considerable detail in advising the prospective delegates what to wear.

It was only about 3 years ago that the first Desk and Derrick Club started in New Orleans where some of the girls in oil offices wanted to get acquainted with others whom they had to call on the phone and also wanted to learn more about the business. Now there are 40 active chapters in oil cities throughout the United States and Canada.

The gals go on field trips to geological outcrops, drilling rigs, refineries, and other places of oil activity, and induce technical men and administrative brass to explain their work. In fact, they're getting so active that they threaten to make mere males move over a bit and give them room on the front seat.

Now the ladies are considering publishing their own magazine, and in a flattering parody on the Big Yellow Book they propose to call it "The Oil and Gal Journal." Watch out, girls; we don't intend to give up our front seat.

Heat or Eat

SOME of these petrochemical visionaries who promise to make practically everything out of oil and gas may be going a bit too far. One of them has computed that the $200 worth of gas we use in our house every year would produce enough fertilizer to grow $13,200 worth of food. We hope this won't be done immediately; we like to eat, all right, but we'd sure hate to go back to shoveling coal. But maybe the difference in figures lies in political arithmetic; the price of gas has been held down while the price of food is soaring, so perhaps the real intrinsic value of the two commodities is about the same.

Henry D. Ralph

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Oil's next shortage will be engineers

DURING the next few weeks thousands of young men will enter colleges and universities, many of them to study engineering and other technical subjects. But there will not be enough engineering students to meet the foreseeable requirements of the oil and other industries.

All indications are that for a good many years the petroleum industry will face a chronic shortage of engineers—using that term broadly to cover graduates in all the branches of science and technology which the industry uses. This comes about through a combination of circumstances:

- Oil companies have come to lean heavily on technologists, snapping up young graduates and using engineers throughout their operations.
- The oil business is growing increasingly complex and intricate, making it imperative to have men with technical backgrounds.
- Virtually every other industry is doing the same, increasing the general competition for engineers.
- The armed forces may continue to drain off young engineer graduates for an indefinite period.
- The number of engineering students is declining now that the GI's are out of school and because the low birth rate during the depression makes high-school classes smaller.

THIS prospect presents a serious problem for oil management. There is no easy solution, but many things can be done:

- Encourage young men to study engineering, through scholarships, talks to students, and information about opportunities in industry.
- Speed up the training period of young engineers so that they are able to take over technical work sooner.
- Use technical men where they are most needed, and less on jobs which don't really require a B.S. degree.
- Spread engineering brains thinner by having assistants do clerical and routine work.
- Establish training-within-industry programs to prepare other employes to handle technical operations.
- Streamline office procedures so that engineers won't have to spend so much time on committee work and report writing and in explaining technical matters to management.

SUCH measures may require reorganization of procedures in many companies, but they could solve the engineer shortage by the same means the oil industry has met its other problems—by improvising, originating, and adapting to new conditions.

An industry which has done so much to promote conservation and efficient utilization of its product can do the same with its technological brains.

A Big Job

NEEDS THE RIGHT EQUIPMENT

● Drilling an oil well is a big job...particularly when footage runs miles deep. Takes the right kind of rig...with skilled, experienced men to handle all operations.

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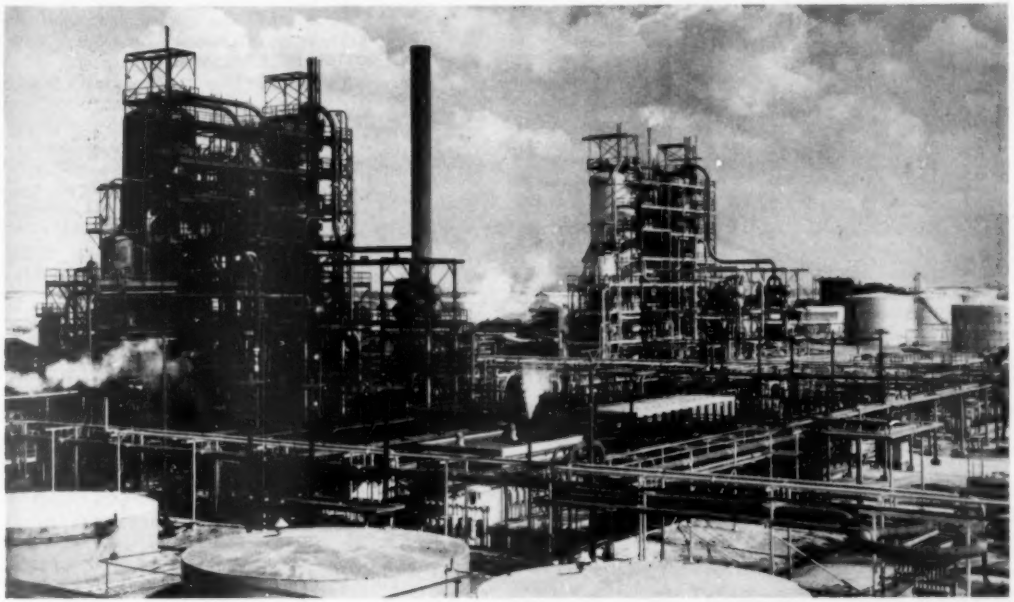


NOT ENOUGH CAPACITY is a current fear of the Petroleum Administration for Defense. J. Ed Warren last week warned that not enough new refinery-construction projects are being planned and that unless more are developed the current nation-wide expansion program will fall short of its goal. These units are pipe stills No. 3 and 4 at the Baytown, Tex., refinery of Humble Oil & Refining Co.

SECONDARY RECOVERY.—Plans for water flooding North Louisiana's biggest oil field—Delhi—announced by Sun and others. . . . Project expected to add 90,000,000 bbl. to field's total recovery. . . . ¶New method of producing oil from Spraberry formation needed to restore impetus to drilling activity in big Trend area. . . . Only 80 rigs now active, compared with more than 190 in May. . . . ¶Signatures of only 9 per cent of royalty interests needed to make world's biggest unit operation in Scurry County, Texas, effective. . . . Project would cover Kelly-Snyder and part of Diamond M fields, including 1,200 wells on 47,000 acres. . . .

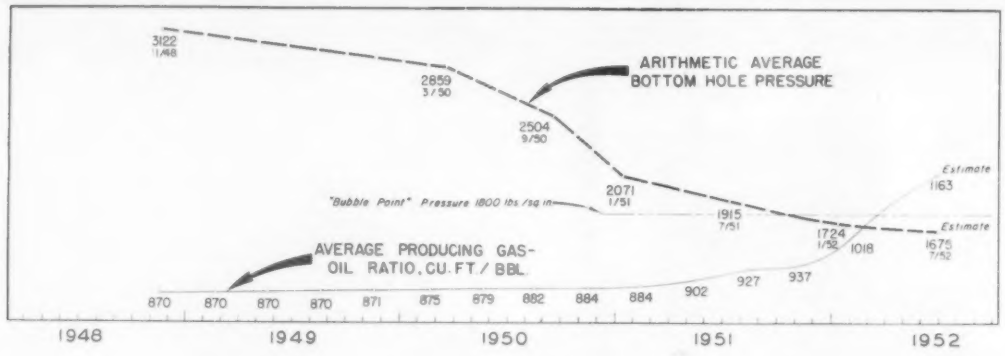
INTERNATIONAL.—Iran offers to settle nationalization issue with payments to Anglo-Iranian for seized properties, but prefaces offer with heavy claims of "back debts" against British firm. . . . No results from offer expected in London. . . . American official concerned about possible Communist revolution. . . . ¶Products in short supply in Argentina and growing worse. . . . Situation results from lack of dollars and from failure to renew meat-for-oil deal with Britain. . . . ¶Chances of enacting new mining law in Egypt more conducive to foreign oil operations considered better with Farouk out of country. . . . Operations now at standstill. . . .

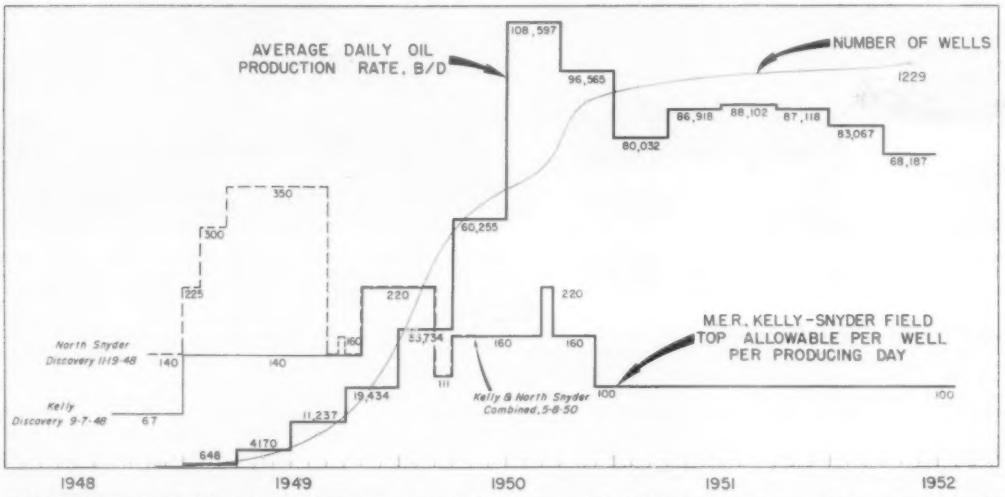
REFINING.—Fast tax amortization approved for Arizona refinery planned by Proven Oil & Refining Co. . . . The project, first for Arizona, would take crude from West Coast Pipe Line Co. crude line from Texas to California. . . . ¶California Standard announces plans for 36,000-bbl. cat cracker at its El Segundo refinery at a cost of more than $20,000,000. . . . Unit will convert heavy fuel into aviation gasoline and high-grade motor fuels. . . . ¶Contract let for construction of 16,000-bbl. Platforming at Shell's Wood River refinery. . . .

PIPE LINES.—Northern Natural buys 51 per cent interest in Permian Basin Pipeline Co. . . . Permian was formed in 1950 to build big gas line from West Texas and New Mexico to connect with Northern Natural's system near Pampa, Tex. . . . ¶Phillips buys Shell's crude-oil line between McCamey and Brookshire, Tex. . . . ¶Buckeye Pipe Line awards contracts for four river crossings on its new products system. . . .

ACTIVITY.—Production of crude and lease condensate averaged 6,266,350 bbl. daily for week ended August 9, up 140,000 bbl. daily over previous week. . . . ¶Well completions, despite steel shortage, continue to climb. . . . Total well completions for week increased 24 to 997. . . . Wildcat completions were 249, 43 more than previous week. . . . ¶Active rotary rigs in the United States decreased to 2,361 for week ended August 11, down 10 from previous week. . . .

TRENDS.—Crude runs to stills at United States refineries for the week ended August 9, were 5.8 per cent greater than the corresponding week of last year. . . . Reflecting current and future needs, the increases in output of finished products over a year ago were: gasoline, 5.2 per cent; kerosine, 10 per cent; distillate, 16.8 per cent; residual, fuel oil, 4.8 per cent. . . . Following the substantial reductions in fuel-oil quotations at Gulf Coast and East Coast points (August 7-8) refinery prices last week were generally unchanged. . . .





WHAT HAPPENED TO SCURRY . . . In the prolific Canyon Reef fields which were the sensation of the oil industry 3 years ago, allowables per well and total production have been cut back as pressure declined and the gas-oil ratio rose. But these events stimulated work on the largest pressure-maintenance project in the world, which is now almost ready for final approval.

Biggest Unit Nearer

Scurry County project awaiting only signature of 9 per cent of royalty owners, approval of Railroad Commission

THE largest unit operation in the world is almost ready to start in Scurry County, Texas, designed to make the Canyon reef of Kelly-Snyder and part of Diamond M fields keep on producing oil for another 40 years.

It awaits only the signatures of a few more royalty owners and then the formal approval of the Texas Railroad Commission. It has already been approved by more than 90 per cent of the working interests and 56 per cent of the royalty interests (65 per cent is needed).

The project will include more than 1,200 producing wells on more than 47,000 acres in a strip 6 miles wide and 18 miles long which bisects Scurry County from southwest to northeast.

From the standpoint of oil recovery it is also the largest unitization ever attempted. Engineers estimate that by present producing methods the Canyon reef sand in Kelly-Snyder and Diamond M fields will produce less than one-half billion barrels of oil. The combined water-flooding and gas-repressuring plan in this unit operation is calculated to increase this by 2½ times to yield well over a billion barrels during the next 40 years.

This Scurry unit is also the biggest of its kind in the amount of engineering data and planning which has gone into it. It has been called a triumph in the science of petroleum reservoir engineering. More than 200 engineers have been working on it over a period of a year and a half.

Why it developed . . . Why this was necessary is shown in the charts at the top of this page. In January 1950, production from Kelly-Snyder was 108,000 bbl. per day; now it is down to about 70,000. Allowables, once as high as 350 bbl. per well in North Snyder, have been cut by the Railroad Commission to 100 bbl. per day.

This decline was the result of a drop in bottom-hole pressure and an increase in the gas-oil ratio—two indexes by which the commission determined that the production rate was too great for proper conservation. Its only recourse was to cut the withdrawal rate, but it initiated studies of pressure maintenance.

Early in 1950, 35 operators in the area met in Midland and created an engineering committee which later became the Scurry Area Canyon Reef Operators Committee — SACROC for short—which now includes 72 oil producers.

About the same time the Railroad Commission ordered bottom-hole-pressure tests taken throughout the field every 6 months. Pressure was dropping so rapidly that the commission ordered producers to show cause why the production rate should not be reduced, and asked the operators to propose plans for oil and gas conservation.

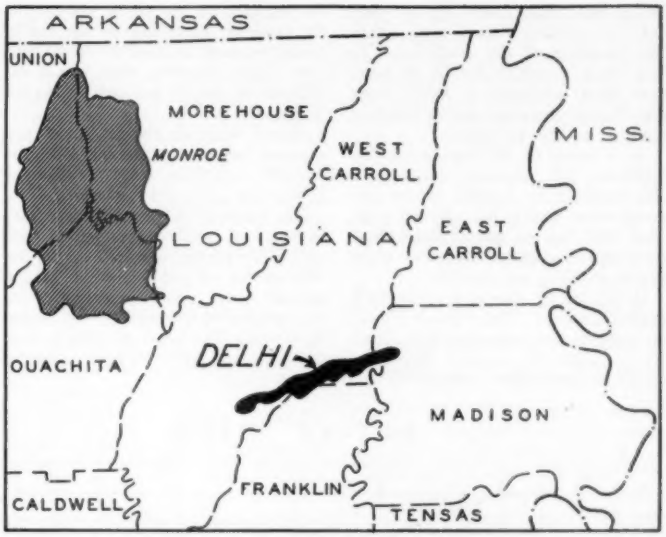
Late that year a water-injection test was authorized in a portion of Diamond M field, as a result of which the SACROC engineers concluded that the Canyon reef was adaptable to pressure regulation through surface injection of water and gas.

Present outlook . . . During the past year there has been a big increase in the gas-oil ratio, recognized by the oil industry as a sign of approaching inefficiency and waste in production. The increase during the past 6 months is said by the engineers to indicate that the reservoir has arrived at a point where injection of gas and water under a unit plan for field-wide repressuring is the only practical way to prevent future waste.

Completion of the unit agreement moved slowly. The participation formula was based on a well factor of 25 per cent and a gross-acre-foot factor of 75 per cent because of the great variance in reef thickness in different parts of the field.

Edge wells in the thinner sections of the reef show the greatest increases in gas-oil ratio and decline in bottom-hole pressure, and would be the first to fall off in production, but under the unit plan they would participate permanently in production from the entire unit.

The operating plan for the SACROC unit is all ready and water for flooding will be available September 1 from a dam on the nearby Colorado River. As soon as 65 per cent of the royalty interests sign the agreement, the Railroad Commission is expected to approve it and the world's largest voluntary pressure-maintenance unit plan will be in operation.



Delhi Flood Planned

Extra 90,000,000 bbl. expected from secondary-recovery project planned for North Louisiana's biggest oil field

Walter Rose

MONROE, La. — A multimillion-dollar waterflood project expected to recover an additional 90 million barrels of oil is being planned for Delhi field of Richland, Franklin, and Madison parishes of North Louisiana.

This was announced last week by officials of the Sun Oil Co., which together with the C. H. Murphy interests owns 65 per cent of the current production.

Operators controlling 90 per cent of the production have agreed to participate in the field-wide secondary-recovery unitization program, Sun said. These operators include Gulf Oil Corp., with a 10 per cent interest; American Liberty Oil Co., 5 per cent; Magnolia Petroleum Co., 3 per cent; and others. Sun will be the operator of the project.

Delhi is the largest field in North Louisiana, having produced more than 45 million barrels of oil since the Murphy-Sun discovery well was completed in December 1944. Reserves still unrecovered are estimated to be in excess of 300 million barrels. Ninety per cent of the field's production has come from the Holt-Bryant zone, a very high permeability sand of Cretaceous age found between 3,200 and 3,500 ft. Last year this sand produced more than 6 million barrels of 40° A.P.I. gravity oil.

The secondary-recovery project is intended to restore the bottom-hole pressure to its original value. Decline in bottom-hole pressure from 1,530 psig. in 1944 to 1,300 psig. today is causing the evolution and production of solution gas. Although 175 of the 199 wells completed in Delhi's Holt-Bryant sand are still flowing, gas-oil ratios have been increasing to the point where lifting costs are excessive.

Approval awaited . . . Before the water flood can be started, consent of royalty owners and approval of the Louisiana Department of Conservation must be secured. These are expected, since the Department of Conservation has already granted approval for 25 other secondary-recovery projects now in operation.

The proposal is to drill four or five water-supply wells in an upper Wilcox sand at about 1,800 ft. About 15 injection wells will be drilled downdip below the southern border of the field. The water-flood will thus be a line-drive type of displacement. The plan calls for an initial injection of more than 6 million barrels of water annually.

Success of the project is assured by current experience in returning produced water to the sand. The Murphy-Sun interests have three disposal wells for this purpose, and Gulf has one. These wells seem to be capable of

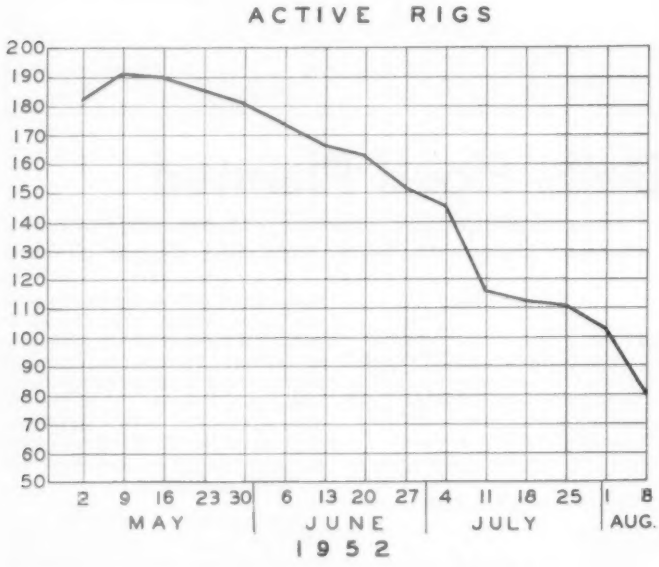
taking more than 3,000 bbl. of water daily by gravity without any noticeable plugging of the sand face. To date about 5 million barrels of water have been produced at Delhi along with the oil, and most of this has been returned to the formation.

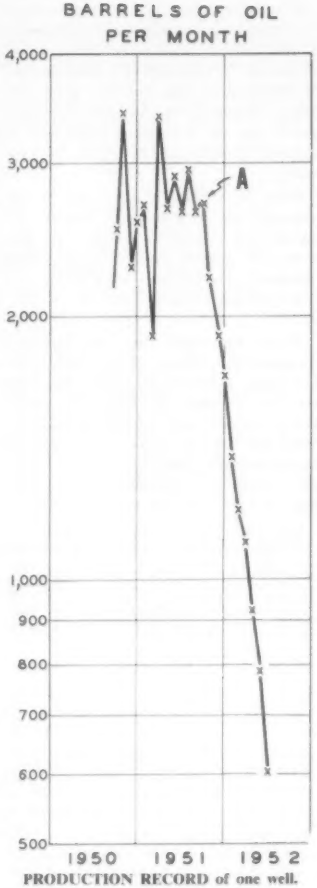
As a result of this experience, the operators are presently planning a closed system for transfer of the produced water back to the injection wells. They feel that no special water treatment will be required especially if filtration facilities are installed.

Project plans . . . After about 2 years of study, it was concluded that recovery at Delhi by primary production would be somewhere between 33 and 50 per cent of the oil in place. Water flooding, according to the study, would produce another 17 to 25 per cent. Total recovery thus would be between 50 and 75 per cent of the oil in place.

Actual work on the project is not planned before the first of 1953, as another 3 months may be required to sign up the royalty interests.

The basis of participation is a formula which involves acre-feet as well as the production measured during the first quarter of 1951 as the reference period. Total initial expenditure for the project is expected to be about $2,500,000. The injection wells, to cost an estimated $35,000 each, will be gravel packed.





PRODUCTION RECORD of one well.

Spraberry Falling Off

Only 80 rigs now active; more pipe, promise of higher oil recovery needed to restore old enthusiasm in Trend area

Roy F. Carlson

MIDLAND.—"Decline" presently describes the big Spraberry Trend area of West Texas.

Pipe shortage is the man-made aspect of the decline; only 80 rigs are now running, compared with some 200 three months ago.

Due to the steel strike, casing is virtually unobtainable for the projected large drilling and completion program in the big Spraberry area. The shortage has been gradually building up and has now reached its peak—at a time when several hundred thousand proven acres remain to be drilled up.

Profit, of course, also is a strong factor in the current picture, because many locations in some sectors simply won't approach a payout with the indicated recovery running less than 1,000 bbl. per acre.

Imbibition awaited . . . Any port in a storm is the watchword of Spraberry reservoir engineers.

The latest big news in the Spraberry is the application of Atlantic Refining Co. for a permit to institute a field test of oil displacement in the Spraberry sand by water imbibition *(The Oil and Gas Journal, August 11, page 72)*. This would be the first test of a secondary-recovery method to be given even the slightest chance for recovery of commercial quantities of oil. And these chances are minimized by engineers.

Since imbibition involves capillary pressures, and capillary pressures depend largely on the presence of very small diameter capillary tubes, the Spraberry sand lends itself admirably to this kind of technique.

The Spraberry has the further advantage of being divided into blocks by the fracture system present in the rock, so that a great deal of surface is presented to the water.

Some method needed . . . The urgency of finding some method of recovering oil after primary depletion is emphasized by the accompanying graph of

Spraberry Statistics For Week Ended July 25, 1952

(Compiled by The Oil and Gas Journal)

Field and county—	Locations	Active rigs	Completions	Accrued comp.	Est. Cal. day prod.	Actual cum. prod. 4-30-52	Est. cum. prod. 7-25-52
Aldwell—R	3	9	3	63	2,340	221,000	431,000
Benedum Spby.—U	5	6	3	113	6,100	963,000	1,500,000
Driver—M-G-R	16	23	8	380	23,900	3,450,000	5,470,000
Flatrock—U	0	1	0	3	80	39,000	49,500
Germania—M-Mar	2	1	0	78	2,400	1,160,000	1,400,000
Midkiff—M-U	9	1	0	80	3,900	714,000	1,066,000
Pegasus Spby.—U	0	1	1	2	40	2,800	4,800
Pembrook—U-R	20	13	1	164	7,500	1,666,000	2,534,000
North Pembrook—U-R	29	19	6	243	14,000	1,700,000	2,940,000
North Sawyer—R	0	0	0	1	5	.....	.....
Scharbauer Spby.—U	0	0	0	1	5	1,400	1,800
Tex Harvey—M-G	55	12	3	545	23,000	9,100,000	11,180,000
Warfield Spby.—M	0	0	0	1	7	1,800	2,400
Weddell—R-S	8	1	1	35	1,130	152,000	246,000
Weiner-Floyd—M-R	27	21	4	202	11,000	1,300,000	2,186,000
Wildcats—G-R	.....	*3	...	...	.....	.....	.....
Total	174	111	30	1,911	95,407	20,471,000	29,011,500

*Two in Reagan County. M—Midland County, R—Reagan County, G—Glasscock County, U—Upton County, S—Sterling County, Mar—Martin County.

production from a Tex Harvey field Spraberry well.

Although this chart is from only one well, it is rather typical of the performance of other wells or leases in much of the Spraberry Trend area.

Production from this well held up at allowable levels for the first year after it was drilled. After this first year of production, output from the well began to decline rapidly.

As shown, plotted on semilogarithmic paper, the monthly production rate has fallen far below the allowable rate. And engineers are nearly all in agreement that this decline will continue.

As illustrated by the chart, production could be at a rate of about 100 bbl. per month at sometime in the middle of 1953. At the depth of the Spraberry this rate would be uneconomical—on the order of 3 bbl. per calendar day.

Gas-oil ratios up . . . And at the same time that production is falling off gas-oil ratios are skyrocketing. Ratios of 15,000 cu. ft. per barrel are not uncommon in some of the older wells. Bottom-hole pressures, too, are affected, falling rapidly as production exceeds point "A" on the chart.

Behavior of the wells has been explained by the low-permeability matrix rock and the fracture system. Initially, the fracture system is supposed to be filled with free oil that has gas in solution, but is undersaturated. This oil can be produced at high rates at low gas-oil ratios.

However, when the fracture system is emptied of this free oil, and production must come from the rock, pressures fall rapidly, along with production, because oil cannot move into the well bore from the extremely tight rock at any high rate. And as the most available oil is produced, oil movement to the bore is slower and slower. The gas moves more readily, however, and gives rise to the high ratios in these older wells.

Estimates revised . . . It has been production histories such as the Tex Harvey well that have caused the constant revision downward of estimates of recoverable reserves.

In early calculations with the use of formulas, many assumptions were necessarily made. These have been shown to be in error in the Spraberry calculations that gave high recoverable reserves estimates. All estimates about the Spraberry are being made more and more cautiously.

Few engineers will commit themselves as far as even estimating oil in place because of difficulty in obtaining good representative numbers for the reservoir. One of the assumptions necessary in most reserves calculations is a figure for net pay, and in the Spraberry this is a difficult number to obtain because of the extremely low permeability.

The accompanying production history takes these assumptions into account because they have already influenced the production history of the well. However, this kind of information becomes available too late to be of value in early drilling operations. It has already become necessary to abandon some wells because of lack of production and excessive gas-oil ratios.

The accompanying statistics table shows nearly current drilling activity and gives estimates of production.

This table shows that in the bigger areas average production of all wells is at a rather low rate even when all new wells are included in the calculations. In Tex Harvey field, for example, a per well average of about 42 bbl. per day is evidenced. Driver field average is 63 bbl. per well. Estimated current cumulative production for these two fields is 20,514 bbl. and 14,000 bbl. per well respectively.

CANADA

Exploration Record

Geophysical operations at peak in western provinces

CALGARY. — Geophysical exploration in Western Canada reached a new all-time high in July with a total 175 parties active in survey work in the four western provinces.

This total surpasses the previous record of a month ago by 7, or about 32 per cent over the same period last year.

Of the 175 parties, 157 are seismograph crews, 15 are gravity meter, and 3 are magnetometer.

Alberta led the provinces with a total of 122 crews in operation, including 111 seismograph crews and 11 gravity meter. Saskatchewan had 41 seismograph crews operating, 4 gravity meter, and 1 magnetometer for a total of 46. There were three active parties in British Columbia, two seismograph, and one magnetometer. Manitoba had three seismograph parties in operation, while the Northwest Territories had one airborne magnetometer crew in operation.

Six major companies are financing the bulk of the large-scale exploration program. Imperial Oil, Ltd., reported the largest number of crews, 23, of which 22 were seismographs and 1 gravity meter. Canadian Gulf Oil Co., Ltd., was second with 15 crews, 12 seismographs and 3 gravity meters.

California Standard Co. had a total of 13 crews, all seismographs. Shell Oil Co. and Socony-Vacuum Exploration Co. each had 12 crews in operation. Texaco Exploration Co. reported nine seismographs and one gravity-meter crew in operation.

About 24 other companies or groups are operating the remaining crews, each with fewer than three active parties in the field.

Imperial Posts New Prices

CALGARY.—Imperial Oil, Ltd., has raised the price of Joseph Lake field crude 8 cents per barrel to 2.33½. Two other new postings announced by Im-

perial were Camrose field (Viking zone) $2.24½, and Armena field (Viking zone) $2.28½ a barrel.

Rail Rates for Oil Cut

OTTAWA.—A sharp cut in railroad freight rates on oil in parts of western Canada has been authorized by the Canadian Board of Transport Commissioners.

The reduction was at the request of rail companies and followed plans of Imperial Oil, Ltd., to set up its own truck-transport system. The companies told the transport board Imperial had found it could effect considerable savings by moving its products by tank truck.

The new rates not announced in detail were made retroactive to April 1.

Pipe-Line Section Finished

LONDON, Ont.—Imperial Oil, Ltd., has completed the 60-mile London-to-Waterford section of its $10,000,000 Sarnia-Toronto products pipe line.

The Sarnia-London section was completed last spring. Next stage in the project will be construction of a double-spur line to Hamilton. This section will include a 5,300-ft. crossing of Hamilton Harbor, the longest underwater fuel-line crossing in Canada.

Comstock-Midwestern, Ltd., is laying the line.

NATIONAL AFFAIRS

Refining Worry

Applications falling off, Warren notes; unless volume increases, construction program will fall short of goal

WASHINGTON. — The oil industry must develop more new projects, and quickly, if the refinery expansion program of the Petroleum Administration for Defense is to be carried out.

A falling-off in applications for new construction in recent months was reported to Interior Secretary Oscar L. Chapman this month by Deputy Petroleum Administrator J. Ed Warren, with a warning that unless the volume of applications increases construction will fall short of present goals for over-all expansion.

Warren's review of the program showed that the industry now plans a total expansion of 1,215,000 bbl. a day in basic refining facilities, of which 819,000 bbl. has been put under construction since the beginning of the Controlled Materials Plan last year.

Of the total planned, facilities for 92,950 bbl. a day had been completed by July 7 of this year. The original program called for completion of 528,600 bbl. of new capacity by next January 1; 742,460 bbl. by July 1, 1953, and 1,078,100 bbl. by January 1, 1954, with the remainder coming in later. This schedule will be set back by as much as 3 months, however, in the case of some projects as a result of the steel strike and consequent steel shortages.

Cat capacity high . . . Warren reported that construction of new catalytic cracking capacity is more than keeping up with expansion of basic crude-running capacity.

The industry has started construction of 563,000 bbl. daily of new cat-cracking capacity, of which 87,190 bbl. already has been completed.

Total cat-cracking capacity now planned by the industry, on the basis of applications for construction approval, amounts to 687,000 bbl. a day, representing about 56 per cent of the quantity of new crude-running capacity for which controlled materials have been allotted by PAD.

Reforming satisfactory . . . Construction of new catalytic reforming facilities is going forward at an even faster relative rate, Warren said.

Construction has been started on facilities with a total capacity of 86,565 bbl. daily of which 10,920 bbl. has been completed.

Total new catalytic reforming capacity now planned by the industry amounts to 221,295 bbl. daily, about 18 per cent of the new crude-running capacity for which materials have been allotted.

Distribution of the new refining facilities by regions is shown in the accompanying table.

NEW CAPACITY FOR CRUDE-OIL PROCESSING
(As of July 7, 1952)

	Barrels per day—PAD district					
	1	2	3	4	5	Total
Construction completed	6,000	51,800	28,150		7,000	92,950
Construction started	201,100	296,990	267,800	11,592	41,725	819,207
Estimated completion by:						
January 1, 1953	75,210	183,290	217,510	11,592	41,000	528,602
July 1, 1953	132,960	273,360	280,850	14,292	41,000	742,462
January 1, 1954	209,100	405,860	375,690	15,292	72,165	1,078,107
Later	229,100	453,860	436,890	15,292	79,890	1,215,032

NEW CAPACITY FOR CATALYTIC CRACKING

	Barrels per day of fresh feed—PAD district					
	1	2	3	4	5	Total
Construction completed	2,300	19,050	56,340		9,500	87,190
Construction started	143,600	103,100	245,040	12,500	58,800	563,040
Estimated completion by:						
January 1, 1953	21,000	78,110	128,640	12,500	39,370	279,620
July 1, 1953	45,100	108,110	165,240	16,400	39,370	374,220
January 1, 1954	143,600	116,580	296,040	21,150	45,370	622,740
Later	152,480	116,580	330,440	21,150	66,170	686,820

NEW CAPACITY FOR CATALYTIC REFORMING

	Barrels per day of charge—PAD district					
	1	2	3	4	5	Total
Construction completed	0	0	10,920	0	0	10,920
Construction started	22,500	27,780	28,025	0	8,260	86,565
Estimated completion by:						
January 1, 1953	1,500	20,850	33,120	0	0	55,500
July 1, 1953	1,500	25,920	42,705	0	0	70,125
January 1, 1954	22,500	68,890	56,205	0	26,090	173,685
Later	30,850	76,890	79,205	0	34,350	221,295

Product Exports Dip Slightly

WASHINGTON.—Exports of major petroleum products averaged 192,000 bbl. daily during the week ended July 18, a slight decline from the 195,500-bbl. average of the preceding week, according to figures of the Petroleum Administration for Defense.

While the total movement showed little change, there were substantial shifts in all of the five major products. Figures in the accompanying table are in thousands of barrels.

	Week ended—		Average
	July 18	July 11	4 weeks
Aviation gasoline	26.8	42.4	35.5
Motor gasoline	16.1	14.8	22.4
Kerosine	0.6	17.3	18.6
Distillate	57.1	74.9	76.8
Residual	91.4	46.1	85.4
Total	192.0	195.5	238.8

New Fields Helpful

Discoveries of past 6 years account for increased crude production in California; older areas just holding own

D. H. Stormont

LOS ANGELES.—While California's oil discoveries of recent years may not have been outstanding, their output is such that they can be said to be responsible for the state's production growth.

During last May the state produced an average of 988,500 bbl. of crude daily, an increase of 153,500 bbl. over the average output during December 1946. As shown in the accompanying chart, based on information prepared by the Conservation Committee of California, new fields and pools discovered in the 1946-1951 period were accounting for 150,500 bbl. of this output.

The chart indicates that drilling in California's older fields has been sufficiently rewarding to offset only their natural decline and that California's gain in production was the result of development in new pools and fields.

New fields promising . . . This year's discoveries are not taken into account in this compilation. Headed by the discovery of a new Eocene pool at Wheeler Ridge, 1952 oil discoveries show promise of being much more important than those of the previous 2 years. By the year's end when they have been further developed, the record of the postwar discoveries probably will be even more impressive.

Conservation Committee figures show that 9,726 new oil wells were completed during the 6 years prior to last January 1. Of this total 1,924 wells had been completed in the 137 new oil pools discovered during this period. Drilling to known horizons in older fields thus had accounted for about 80 per cent of the new oil producers.

At that time these new pools were turning out 145,000 bbl. daily out of a state total of 977,000 bbl. Total production during May was 11,500 bbl. higher, of which about 6,000 bbl. was from pools opened in the 1946-1951 period.

Pool average low . . . That these 137 new fields and pools are generally small is reflected in the fact the per-pool average during May was only 1,100 bbl. daily. Only one discovery, the Holman pool at South Cuyama, was producing in excess of 20,000 bbl. daily. Sand Ardo's Lombardi pool and the Diblee at Russell Ranch were the only other new pools capable of producing over 10,000 bbl. daily. Four discoveries were producing between 5,000 and 10,000 bbl. daily, and of the remainder only 20 were exceeding 1,000 bbl. daily.

How rewarding has each year been, and what are prospects for additional development? Based on May figures, this is the record:

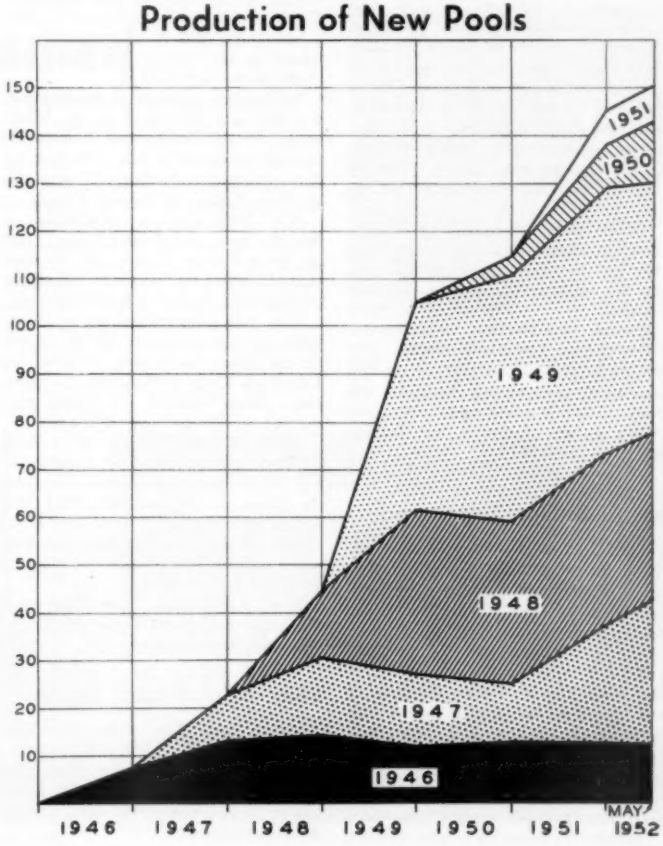
. . . 1946 discoveries accounted for only 11,100 bbl. With but few exceptions the 19 new pools of that year appear fully developed; last year they received only 7 new oil wells. Reaching a peak production of 14,000 bbl. in December 1948, their production has since been declining.

. . . 1947 discoveries totaled 34, of which the Lombardi pool of San Ardo field was by far the most important.

During May it averaged 14,100 bbl., almost one-half of the 31,200 bbl. being contributed by 1947 new pools. It now contains over 200 producers and with development continuing its production is rising from month to month.

. . . 1948 new pools, totaling 29, were yielding 35,700 bbl. daily. The year was highlighted by discovery of Diblee pool at Russell Ranch, the Leda zone at Guijarral Hills, and the Aurignac sand at San Ardo. These three were accounting for 27,800 bbl. of the total.

Aside from the Aurignac pool, which now contains almost 100 wells and is continuing to grow in importance, it appears that these discoveries will con-



tribute but little more to a production growth.

Development also is continuing at Guadalupe and Tejon Hills, two 1947 discoveries, but new production from all three fields is offset by natural decline.

... 1949 discoveries were few in number, only 15, but they included Holman pool in South Cuyama. Of the 52,300 bbl. being produced by this group, 36,800 were from this pool. South Cuyama, however, is declining in output and little drilling is being done in other 1949 new pools.

Though producing only 5,300 bbl. daily during May, Juanita pool at Placerita Canyon was an important 1949 discovery.

... 1950 and 1951 discoveries were contributing 12,900 and 7,400 bbl., respectively, a combined increase of about 4,000 bbl. over their January output.

With but few exceptions, however, the 40 new pools discovered during these 2 years are proving to be of relatively minor importance. None was producing as much as 3,000 bbl. in May, and only 8 were exceeding 1,000 bbl. daily.

Three discoveries in the Honor-Rancho-Castaic Hills area are expected to reach a combined total production in excess of 10,000 bbl. daily. The Wayside zone, a 1950 discovery, was producing 2,600 bbl. daily from eight wells. In the Castaic Hills are the Sterling sand's 10 producers were yielding 2,300 bbl.

Of the other 1950 and 1951 discoveries, an upper sand at Castaic Junction and the Tar sand in Block 5 of the Wilmington field hold the greatest promise.

During May the five wells in zone 10 at Castaic Junction produced 1,000 bbl. daily. The 28 producers in the new fault-block pool turned out 2,800 bbl. daily. The Wardlow pool at Long Beach, a 1951 discovery, was yielding less than 1,000 bbl.

Island Drilling Threatened

LONG BEACH.—Preparations being made for the drilling of a wildcat 1½ miles offshore in San Pedro Bay will be halted if the city of Seal Beach finds it has the legal right to do so.

The city claims that its boundary extends 3 miles seaward from shore, that the drilling island being constructed by Monterey Oil Co. is within this boundary, and that no such project may be undertaken without the city's permission.

Last week city officials conferred with state attorney general personnel.

Monterey meanwhile was continuing to drive piling for the $1,000,000 filled-land island from which it intends to drill three exploratory wells. The project, in which The Texas Co. holds a fifty-fifty undivided interest, has been approved by the state Lands Commission and by the War Department, Justice Department, and Department of the Interior.

The 1,400-acre tidelands lease was granted by the state in 1947, prior to the Supreme Court ruling that the Government had paramount rights in the tidelands.

ROCKY MOUNTAIN

Oil in Mesaverde

Stanolind gets first Green River basin production

DENVER.—First oil recovered from the Mesaverde formation in the Green River basin was found last week by Stanolind Oil & Gas Co. in its Middle Mountain area wildcat in Wyoming's Sweetwater County.

On a 2-hour drill-stem test, Stanolind recovered 1,400 ft. of free oil and 400 ft. of water from the zone 6,532-54 ft. in its 1 Unit. It continued coring ahead.

Earlier the wildcat flowed gas to the surface in 35 minutes and recovered 720 ft. of light-green, 53°-gravity oil in a 1-hour test of 7 ft. of saturated sand found in the top of the Mesaverde in the section 6,536-52 ft.

While the important development was the first oil found in the Mesaverde, gas had been found in noncommercial quantities in that formation by Amerada Petroleum Corp. 2 years ago at Deep Creek, in Carbon County.

The Mesaverde is productive at Beaver Creek, in Fremont County, and at West Poison Spider, in Natrona County. The only important Mesaverde production is found in San Juan basin.

The new Stanolind discovery highlights current increased activity in the Green River basin and follows the Lance gas strike at Hiawatha, 20 miles east, where Wasatch and Lance production of Eocene age is found.

About 15 miles northeast of the Stanolind well, Mountain Fuel Supply Co. has a Canyon Creek wildcat slated for the Mesaverde. Mountain Fuel also is drilling below 6,000 ft. at Trail Unit. Carter Oil Co. has announced location for a 6,000-ft. Mesaverde test in Moffat County, Colorado.

For an article on production from the Mesaverde formation in the Rocky Mountain area, see page 185.

Rank Wildcat Finds Gas

DENVER. — The twenty-third discovery of 1952 in the Denver-Julesburg basin has been announced by F. Kirk Johnson and Dunn and Boreing et al at 1 State, 12 miles east of Sterling, Colorado.

The operator tested gas at the rate of 6,000,000 cu. ft. per day from each of the two zones in the "J" sand.

This is the first well in Logan County to find production south of the South Platte River, increasing the prospects for finding additional production in the area.

Important Tests

Six wildcats scheduled for Montana and North Dakota

WILLISTON, N. D.—Six important wildcat locations were announced last week for the Williston basin and Blood Creek syncline areas of Montana and North Dakota, giving impetus to the region's ever-groving exploratory drilling program.

Plans for the first wildcat in Sheridan County, Montana, were announced by S. L. Shepherd and Deardorf Oil Co. The test was reported to be a Devonian project.

In Roosevelt County Deep Rock Oil Corp. scheduled a wildcat just west of the North Dakota state line. The company also announced it will drill test to the Devonian in the Church area of Morton County, North Dakota.

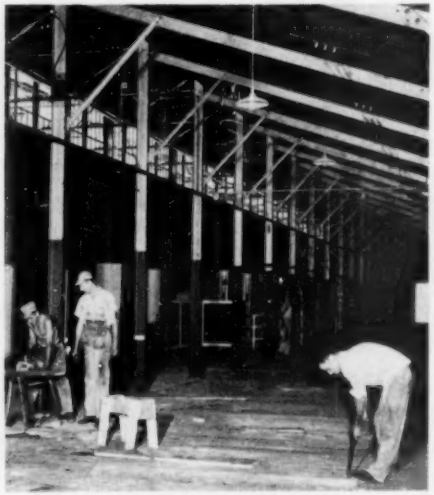
Three other Montana locations announced were: Continental Oil Co., a Phillips County test in the Blood Creek area; L. S. Youngblood, test of the Devonian in Fergus County's Ford Creek area; and Northern Pump Co., a wildcat in eastern Hill County, northwest of Bowes field.

As these locations were staked Amerada Petroleum Corp. completed two good wells in the Tioga area of North Dakota and another in the Beaver Lodge area.

The completions were the company's 1 Ramberg, an east extension at Beaver Lodge, for 22 bbl. hourly; 1 McGuiness, ½ mile east of the Tioga discovery, for 9 bbl. hourly; and 1 Borstad, ½ mile northwest of the Tioga discovery, for 215 bbl. daily.

North Dakota's production reached 4,500 bbl. daily during the week ended August 9, surpassing output of Florida, Alabama, and Utah. The state now has a total of 28 producing wells, including 21 at Beaver Lodge and 7 at Tioga.

EXPOSITION GROUNDS, photographed during 1948 exposition, and showing the area now being prepared to house additional exhibits next year.



BUILDING FLOORS being checked and repaired. Workmen are in a long building appearing in photo at left.

I.P.E. Site Readied

Grounds being enlarged for 1953 oil show, expected to display products of more than 1,000 equipment makers

EXPANSION work is actively under way at the grounds of the International Petroleum Exposition in Tulsa where the thirtieth anniversary oil show will be held May 14-23, 1953.

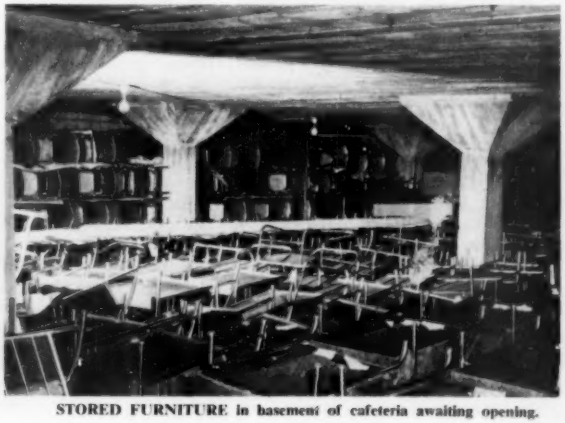
An additional 35,000 sq. ft. of exhibit space has been acquired and is now being graded and equipped with streets and utilities.

The developments in oil-industry equipment and the increased number of firms in the industry since the last oil show in 1948 that exhibitors are clamoring for still more space to demonstrate their equipment to the thousands of operating oil men who will visit the exposition. As a result, the I.P.E. board of directors is negotiating for still more space by utilizing part of the adjoining Tulsa Fair Grounds.

Already, 9 months before the show opens, the I.P.E. management has signed space contracts with 622 exhibitors, compared with the total of 574

DELIVERING INVITATIONS throughout Latin America are Oscar B. Irizarry, left, editor of Petroleo Interamericano, affiliate of The Oil and Gas Journal, and Oklahoma Gov. Johnston Murray, shown here as they left the United States.

SEWER LINES being laid in the new exposition area.



STORED FURNITURE in basement of cafeteria awaiting opening.

exhibitors at the 1948 exposition, and many more inquiries have been received. Since many of the exhibitors are supply firms handling the products of several manufacturers, it is expected that the products of more than 1,000 equipment manufacturers will be on display when the grounds open.

Rehabilitation and improvement is going on in the exhibit halls owned by the exposition, and some of the long-time exhibitors already have begun to refurbish their privately owned buildings and booths on the grounds.

The I.P.E. is spending about $100,000 in repairing and renovating the buildings and utilities in the 20 acres of the exhibit grounds.

Cartel Denied

Justice Department saw its agreements, Texaco says

NEW YORK.—The Texas Co. last week joined in denials already made in the industry of the existence of an international oil cartel.

The company recalled that the contracts covering its principal jointly owned operation abroad — the Saudi Arabian concession — were twice discussed with the U. S. attorney general and that copies of the executed agreements were filed with the Department of Justice immediately after their execution.

No objection of any kind was ever interposed to the making of these agreements, the company said. Besides this, the facts concerning the company's interests in its affiliates engaged in the international oil business have been set forth in reports to the Securities and Exchange Commission and have been given to congressional committees who were interested in the matter.

The Texas Co. statement was issued in New York by W. S. S. Rodgers, board chairman, and J. Sayles Leach, president, following the serving of subpoenas for the investigation before the grand jury in Washington, September 3. Texaco and 20 other companies were named in the subpoenas.

Blanket denial . . . The company's statement pointed out it did not know what the Federal Trade Commission's secret report contains, but felt that its millions of customers, employes and stockholders were entitled to a statement from the company on the matter.

"The policy of The Texas Co. is to obey the law," the statement said. "The Texas Co. is not a party either directly or indirectly through any subsidiary or affiliated company, to any international oil cartel or any price-fixing arrangement of any kind, or any monopoly, whether international or domestic, nor do we believe that other oil companies are involved in any such cartel."

Other denials of the cartel charges were made last month by officials of most of the principal companies involved.

The subpoenas which were served on the companies were described as being of the "kitchen-sink" variety in that they took in virtually everything. Presumably this year was chosen because it marked the beginning of American participation in Iraq Petroleum Co., Ltd., an interest which incidentally was acquired only with the assistance of the State Department.

In some industry circles, there is a disposition to regard the investigation as a political maneuver calculated to make the large oil companies a whipping boy before the national elections.

TECHNOLOGY

New-Type Storage

Swedish idea to be introduced here stores products in porous underground caverns below ground-water level

WASHINGTON.—A new method for underground storage of oil, utilizing ground-water pressure against a container which need not be nonporous, is to be introduced in this country from Sweden.

Developed by Harald Edholm, a Swedish government official, the "container" is an underground excavated or natural cavern with any permeable part of its walls or roof below the water table, relying on the presence and pressure of the surrounding ground water to prevent loss of the stored material.

Effectiveness of the system lies in the fact that oil is lighter than water so that any leakage through pores and fissures in the rock walls or roof would be water entering the tank and not stored material leaving it. Incoming water is removed by a pump as necessary to maintain the required pressure differential.

To fill the storage, water is pumped out as oil is introduced. As the oil is withdrawn the water is permitted to leak in naturally.

Existing projects . . . Two underground storage projects are already in actual use in Sweden and a third is under construction. One project is an abandoned feldspar mine holding 1,040,000 bbl. of fuel oil, in operation since 1949. The Swedish government estimates it has saved $6,000,000 in storage and transportation costs by buying oil when tanker rates were low and holding it in the mine.

A pilot-plant gasoline storage tank of about 113 bbl. in badly jointed gneiss, has held gasoline for more than a year with less than 1 quart loss. The project under construction will be another feldspar mine for storage of gasoline, with a capacity of about 190,000 bbl.

In a report on the system for Henrik Mannerfrid, Inc., New York, which is introducing it in this country, Max W. and Douglas Ball, oil and gas consultants, concluded it would be feasible in many areas of the country. Exceptions would be parts of the western states where the water table is far beneath the surface, and some of the Great Lakes states, the Gulf Coast, and the Permian Basin, where sedimentary salt formations or salt domes lie under the surface and offer equally cheap or cheaper storage.

Where rocks competent to maintain open caverns are not present, open-bottomed caissons may be sunk through unconsolidated sediments.

Cost estimates . . . Costs of Edholm containers would vary according to the type of rock penetrated, and the depth and size of the underground cavern, and are estimated to run from $6.80 per barrel for 50,000 bbl. of storage in Niagaran dolomite, 300 to 400 ft. below surface, in the Chicago area, to as little as 75 cents per barrel for 50,000,000 bbl. of storage at 1,000 ft. in limestone in northern Illinois. Most of the cost would be in preparing the cavern, and the pipe, pumps and other equipment needed would be relatively inexpensive. Since the underground storage would not deteriorate, first cost in effect would be all the cost.

Beside the cost advantage, the Edholm system offers adequate protection against fire and other losses and is less susceptible to enemy attack than above-ground storage. In Sweden, the underground fuel-oil reservoir has been covered and planted over and is an undetectible part of the landscape.

Copies of the Ball report have been submitted to military and civil defense authorities.

THROUGH A MOUNTAIN VILLAGE goes the recently completed Puerto Salgar-Bogota line.

RUGGED TERRITORY is crossed by the 87-mile line, which climbs more than 8,400 ft. along its route.

New Line Operating

Mountainous Colombian products carrier puts end to old problem of supplying capital with river, tank-car delivery

NEWEST addition to the growing mileage of products pipe lines in Latin America is the 87-mile system which supplies the Colombian capital of Bogota.

Three views of the project are shown in the accompanying Standard Oil Co. (N. J.) photos. The line went into regular operation in mid-July.

It was built by Williams Brothers for the Department of Cundinamarca, which obtained a 6,000,000-peso loan from Esso Colombiana S. A., toward its 9,500,000-peso (about $3,800,000) cost. The loan will be repaid during the next 4 years. During this period, Williams Brothers will operate the line and train Colombians in this work.

The new pipe line will do away with the gasoline-supply problems that have plagued Bogota for years. The capital has heretofore been dependent on the railroad from the Magdalena River terminal. However, during the rainy season slides along the railroad's right-of-way often prevented delivery. On the other hand, during the dry season the river dried up, forcing Esso Colombiana and its predecessor, Tropical Oil Co., to move products overland with an emergency fleet of tank trucks.

With present pumping facilities, the pipe line has a capacity of 8,850 bbl. daily in contrast to Bogota's present demand of about 3,400 bbl. daily. The line's capacity could be raised to about 23,000 bbl. daily with the installation of additional pumping stations. Present plans call for operation of three stations.

The line originates at Puerto Salgar, the Magdalena River terminal of Esso Colombiana. The elevation at this point is 570 ft. The line rises to a maximum of about 9,000 ft. some 50 miles from the Bogota end of the line, and then drops to the approximately 8,600-ft. elevation of the Bogota terminal of Esso Colombiana.

Puerto Salgar is supplied from the Barrancabermeja refinery, which is operated for Empresa Colombiana de Petroleos by International Petroleum Co., Ltd. A pipe line runs from Barrancabermeja to Cantimplora, and a project now planned calls for completing this system with a line from Cantimplora to Puerto Salgar.

ORIGIN OF THE LINE is this tank farm of Esso Colombiana in Puerto Salgar, on Colombia's Magdalena River.

Iran Makes Offer

But it's strictly one-sided and based on acceptance of nationalization; British are silent, Acheson concerned

Dahl M. Duff

THE Iranian Government has come up with an offer to settle the oil-nationalization dispute—but strictly on its own terms.

Prime Minister Mossadegh's Government demanded that Anglo-Iranian Oil Co., Ltd., pay "tens of millions of pounds" in alleged back debts, plus indemnities for delays. When this is done, the Iranian Government indicated it would then be ready to negotiate with the company on the basis of the nine-point Iranian oil nationalization law.

The British Government showed little disposition to give any serious consideration to the Iranian proposal. However, the U. S. State Department, again showing its concern over the possibility of a Communist revolution in Iran, was reported to be placing pressure on the British to soften their stand and find a compromise settlement.

The situation was roughly the same as it was about a year ago. At that time, the State Department was anxiously seeking some kind of British deal with Dr. Mossadegh, who was considered to be the bulwark against Communism. The British on the other hand were not willing to recognize the expropriation and seizure of oil properties worth more than a billion dollars.

The Iranian proposal was made in a note to the British Government, the text of which was released in Teheran. Iran made it clear that any negotiations would be between Iran and the company, not Iran and the British Government. This is in line with Iran's contention that the dispute is a domestic matter involving only a private company.

Iranian claims . . . Although the Iranian Parliament refused to ratify the agreement increasing royalties in 1949 and it thus never became effective, the Iranian Government said this was money that was due it. It even claimed an indemnity for delay in paying the debt.

Anglo-Iranian has been setting aside sums which would be due to Iran if the agreement were ever ratified to begin as originally planned. From 1948 to 1950, the agreement would have increased royalties by about £38,000,000, or more than $100,000,000.

Other money which Iran claimed to be due consists of blocked Iranian holdings in Britain, also with indemnity for delay in releasing these sums. In some quarters, it was believed that the Iranian demands for money from the company were an effort to build up counterclaims to the British case for compensation from Iran for the expropriation.

First reaction from London to the Iranian note was extremely cool. It was pointed out that the Iranian offer was predicated on British acceptance of Iran's nationalization law. Under this assumption, there is little left for discussion except compensation for the properties. The Iranian note said the dispute could be settled in Iranian courts if the negotiations failed.

Washington view . . . Reports from Washington, however, said Secretary of State Acheson was deeply concerned. The State Department view all along has been that the increasing financial troubles resulting from the loss of oil revenue in Iran was creating a situation ripe for Communism. The earlier British position was that Prime Minister Mossadegh would eventually give way to a more moderate government which would be more amenable to negotiation. It seemed somewhat significant that the British did not at once officially reject the Iranian note. Conferences on high government levels were under way in London and in Washington.

Iran's failure to date to make a go of its nationalized oil industry arises from the fact that it has been unable to make export sales abroad. Washington is reported to have suggested to London that an arrangement be made with Dr. Mossadegh whereby Iran would resume export sales on condition that part of the proceeds be paid to Britain as compensation for the properties.

Another possibly important development is the visit to the United States of Hussein Makki, firebrand nationalist and one of Mossadegh's principal assistants. Makki will be a guest in the United States of the International Bank for Reconstruction and Development. He is already in Germany on his way to this country.

Meanwhile, last week, Mossadegh received the grant of powers from the Iranian Parliament, enabling him to run the country as virtual dictator for the next 6 months.

Improved Outlook

Egyptian problem believed to be closer to solution

RECENT political events, including the abdication of King Farouk, appear to have improved the prospects of a settlement of the long-standing legal problems which have brought oil development in Egypt to a standstill.

The hope is that the result will be a new political atmosphere in which definite action can be taken on the proposed new mining law in a form acceptable to the operating companies.

The concession problems of the oil companies in Egypt stem largely from the 1948 mining law. Among other features, this law gave no guarantee that a company doing successful exploration would receive rights to produce its discovery. Standard Oil Co. (N. J.) found its terms so restrictive that it withdrew from the country. Socony-Vacuum Oil Co., Inc., and Anglo-Egyptian Oilfields, Ltd. (Royal Dutch-Shell) are confining their activities to production from old leases. At the present time, there is not a single rig running in Egypt on exploration or development.

The companies operating in Egypt have repeatedly brought to the government's attention that the absence of further exploratory work will inevitably result in a gradual decline of domestic production and an increased dependence on imports. Egypt's production now averages about 45,000 bbl. daily, and last year an estimated approximately 20,000 bbl. daily was imported. Egyptian crude runs heavily to fuel oil, and nearly half the petroleum imports were kerosine.

No early solution . . . Even with the new and apparently somewhat more favorable regime in Egypt, however, no early solution to the oil problem can be expected. The Parliament, which will have to approve any oil law to be satisfactory, is now adjourned, and the country's new leaders are confronted with many pressing matters.

Recent reports from Cairo said the government had amended the provisions of the company law which held foreign capital to a minority in an Egyptian enterprise. Foreigners are now allowed 51 per cent or more of a company's share. This change, which eliminates the wholly minority position of

foreign interest, is an added incentive, but in itself is not considered sufficient to attract new foreign oil capital into the country because of other legal restrictions.

Intermittent negotiations between the government and the companies have continued for several years but without final action. In regard to petroleum pricing, the government and the companies agreed last year on a formula under which the value of indigenous production would be raised to the world level by the end of 1954.

Israeli Opening Nears

New, liberal petroleum law expected to be enacted this month; regulations to administer it now being drafted

ISRAEL is expected to be opened for oil-exploration operations by American and other foreign interests within a few months.

Regulations under which the new petroleum law will be administered are now being drafted. The petroleum law is expected to be enacted by the Israeli Knesset this month.

In Washington last week an Israeli representative discussed the proposed regulations with Max W. and Douglas Ball, oil and gas consultants who last year reported to the government that possibilities of oil development are good in more than three-fourths of the country.

The new petroleum law will provide for concessions to foreign oil interests on terms comparable with those prevailing in the United States. Permits for preliminary investigations will be issued freely, but Max Ball said so much high-quality geological work has been conducted by the British during their mandate over Israel, the Iraq Petroleum Co., which with the Jordan Exploratory Co., formerly held concessions, and by Israeli geologists that little such work will be required.

Concession terms . . . Licenses for exploration will be granted on maximum areas of 100,000 acres, and no licensee will be permitted to more than three licenses in any one of the four districts into which it is proposed to divide the country. The annual license fee will be $5 per 250 acres, for a primary term of 3 years and a maximum of 7 years.

A licensee making a discovery will be granted a lease on an area selected by him for a maximum of 62,500 acres in one lease and 187,500 acres in one district, to run for 30 years and renewable for a further 20 years.

Stiff requirements are laid down to insure that licensees and lessees carry out their obligations diligently, but the only revenue the government will derive from oil operations will be a one-eighth royalty. Lessees will have complete authority to produce, process, and trade in petroleum and will be permitted to import everything required in their operations, other than consumer goods, free of customs.

Oil prospects . . . The Ball report, submitted to the government last September, found that all of the eight geologic provinces into which the country is divided by structural differences have oil possibilities, although they differ in character and degree.

Structural and stratigraphic traps probably exist in the Upper Jordan Valley and the Emeq to the south, but they will be hard to find, the report said.

In the faulted anticlines and blocks of the Gallilee highland and the Carmel uplift adjacent to the Jordan Valley and the Emeq, the chances are good. Somewhere beneath the Dead Sea-Wadi Araba area must be large oil and gas accumulations, and despite the difficulties of search in a rift valley, the province's possibilities are considered good. The Negev, a desert region comprising the southern half of Israel, has numerous structures worth testing; the foothills belt and coastal plain are folded and further work should reveal structural highs underlain by thick sections, predominantly marine, the report said. Stratigraphic traps are indicated for the Negev, the foothills belt, and the coastal plain.

Drilling history . . . Only one well has been drilled for oil in Israel, by Iraq Petroleum Co. Work on the well was halted at 3,464 ft. when the Israeli-Arab hostilities broke out, with 8,000 to 10,000 ft. of sediments undrilled, but dip readings indicate it was offstructure at depth.

A well at El Khabra in Sinai, 8 miles across the border, stopped in the Jurassic at 10,282 ft. without encountering oil. It also was offstructure at depth.

Several thousand water wells have been drilled throughout the country to as deep as 1,000 ft. with only one encountering oil or gas. Ten core holes have been drilled in the Dead Sea area for geologic information, two of them going through thick impregnations of live asphalt.

In anticipation of the opening up of the country, Ball said, a number of independent and at least one major American, Canadian, and Swiss companies already have approached the Israeli Government.

Operations will be far more simple than in any other Middle East area, because no part of the country is more than 23 miles from a black-top highway and, while the nearest supply house will be several thousand miles distant, there are excellent machine shops, a steel mill, and other industrial facilities in Israel.

International Briefs

The lubricating oil plant at the Dunkirk, France, refinery of Soc. Generale des Huiles de Petrole, B.P., Anglo-Iranian Oil Co., Ltd.'s, French associate, went into production recently. The plant, which has a capacity of 55,000 tons per year, or slightly more than 1,000 bbl. daily, will supply the French and North African markets of S.G.H.P., and the balance will be exported to other continental markets.

New oil production is reported to have been discovered about 2½ miles south of Sumberredjo village in East Java's Malang district, according to a Reuters dispatch from Malang. The discovery has been reported to local authorities, and oil experts from Djakarta are expected to make further investigations.

The Italian Montecatini company has been carrying out seismograph work near Ponte al Bozzone, about 3½ miles from Siena in Italy. The results of the surveys have been encouraging, and the exploration work is being continued. Last June gas was discovered on Mount Amiata, also in Siena Province.

The Australian company, Ampol Petroleum, Ltd., has announced that it has signed a 5-year charter for the 18,250-ton tanker Wigand now under construction in England. The vessel will be able to deliver about 1,000,000 bbl. annually of products to Australia. Ampol has chartered another 15,880-ton tanker and also is building a 17,880-ton vessel in England.

Petroleos Mexicanos has announced in Mexico City that it built 11 schools in oil-producing centers and spent about 13,000,000 pesos (about $1,500,000) on the modernization of others during the last year. This brings the number of schools maintained by Pemex to about 40 with a staff of 343 teachers.

FAR EAST

Property Return

Indonesia board votes to release B.P.M. facilities

THE Indonesian State Mining Commission has voted to return to Bataafsche Petroleum Mij. (Royal Dutch-Shell) its producing and refining properties in North Sumatra.

The vote was 4-3 in favor of returning the property, according to the Indonesian Information Office in New York. The government's financial and economic board has reportedly approved the decision, and it now awaits the signature of Economic Affairs Minister Sumanang.

Opposition to the move is anticipated from the Indonesian concerns working the area at the present time, the Information Service said. There may also be opposition in Parliament. The proposal also will be fought by Hussein Mudjahid, head of the north Sumatra Mining Department, who has championed nationalization of the fields.

Background . . . North Sumatra is the birthplace of the Royal Dutch Petroleum Co. The company obtained its first concession in North Sumatra June 16, 1890, from the Sultan of Langyat.

This area, along with other East Indies oil properties, was evacuated by the operating companies in the face of the invading Japanese in 1942. Although the companies were able to return and resume operations in other areas in the immediate postwar years, North Sumatra continued to be denied to B.P.M. The Indonesian Government's control in the area has not been too firm.

Since the company was unable to reenter the area, local Indonesians took over after the war and began operations on a small and makeshift basis. Prewar, B.P.M. had in North Sumatra a refinery and 10 separate fields. The refinery, Pangkalan Brandan, had a listed capacity in 1939 of 18,000 bbl. daily. In that same year, the North Sumatra fields produced a daily average of nearly 22,000 bbl.

Information coming out of the area indicates that the Pangkalan Brandan refinery was destroyed by air raids during the war. The field properties have undoubtedly badly deteriorated over the last 10 years, 4 under Japanese control and the last 6 under local Indonesian groups.

Other problems remain . . . Regarding other current oil developments in Indonesia, reports are that the difficult tax and legal problems confronting the other major operators. Standard Vacuum Oil Co., have not been settled on a long-term basis, although the export tax on production has been lowered and the company has agreed to maintain a stated level of production.

This presumably is an interim agreement pending a possible full settlement of all matters in dispute. Early this year, the goverment's total levies against the company in taxes of various kinds, royalty, and foreign exchange were said to amount to some more than 75 per cent of its revenue *(The Oil and Gas Journal, April 14, page 115).*

LATIN AMERICA

Gasoline Pinch

Lack of dollars, tiff with British result in shortage

ARGENTINA has cancelled all special gasoline-rationing permits because of the prospects of an even greater pinch in its motor-fuel supply.

Argentina has been rationing gasoline since last January. At the time the system was instituted there was a blast from official circles at "imperialistic egotism" which was said to be punishing Iran and creating serious difficulties for many other countries.

In Buenos Aires, the government said recently the necessity to build up reserves of motor fuel for harvesting and movement of the grain crops forced the cancellation of the special gasoline permits.

Back of Argentina's fresh difficulties with its oil supply are two factors: lack of foreign exchange and failure to negotiate a new trade agreement with the British. Talks over another meat-for-oil trade deal were originally started in February. No agreement was reached, and the old agreement became virtually inoperative at the beginning of July. The discussions were resumed only early in August.

Argentina's domestic oil production is falling increasingly short of meeting domestic consumption. The country is now importing approximately twice what it is producing. During June, petroleum imports were sharply down from the previous month but were still at a rate of nearly 6,000,000 tons a year, or about 120,000 bbl. daily.

Argentina's petroleum imports are shown in the accompanying table. During June of this year, all the gas oil and diesel came from Curacao, N.W.I., and the kerosine from Corpus Christi.

ARGENTINA IMPORTS
(in metric tons)

	June 1952	May 1952	June 1951
Fuel oil	237,147	342,794	253,488
Crude petroleum	237,927	309,427	249,640
Diesel oil	3,070	13,743	.....
Gas oil	3,824	.....	.....
Naphtha	.....	2,448	3,940
Kerosine	9,961	.....	173,990
Total	491,929	668,412	681,058

Dominion Opens Offices

Standard Oil Co. of California's new West Indies subsidiary, Dominion Oil Co., Ltd., has established headquarters in Port of Spain, Trinidad, to carry out exploratory operations in that island.

Resident manager for the company is R. I. Leverson, geologist formerly with The California Co. Officers of the company include K. H. Crandall, vice president of the parent company, chairman of Dominion Oil, and G. M. Furnival, vice president of the California Standard Co., Calgary, Alta., president of Dominion Oil.

Formation of the Dominion company as a wholly owned subsidiary was announced in July by California Standard. The company has acquired leases or made application on approximately 700,000 acres located on the island and adjacent sea bottom.

The West Indies is an entirely new area of exploratory interest to the company, while the present exploration and production in Trinidad is almost wholly in the hands of British-controlled companies.

New Pemex Line Operating

A 25-mile gas pipe line from Monterrey to Hidalgo in the State of Nuevo Leon in northern Mexico has been inaugurated by Petroleos Mexicanos.

The line is 100 mm. (about 4 in.) in diameter and serves the factory of Cementos Hidalgo. Its construction was described as a further step in Pemex's plans to provide an adequate distribution system for the country's sizable gas reserves.

Pemex's plans call for the completion of a line from Reynosa in Tamaulipas to the Atzcapotzalco refinery in Mexico City by way of Poza Rica. This project is being held up by a shortage of pipe since Mexico's pipe production at Monclova is insufficient and imports from the United States have been curtailed by the steel strike.

"It's foolish to try to be bigger than you are"

REMEMBER Aesop's fable of the frog and the ox? Told 2,500 years ago, it goes:

"Three young frogs cried to their mother that a little brother had been trampled by the largest beast in the swamp. 'Oh, no,' said the mother, 'no beast is larger than I.' And she blew herself up to show how big she really was. 'But it was much bigger,' the little ones chorused. Whereupon the vain mother inflated herself until she burst." And the moral was, "It's foolish to try to be bigger than you are."

Aside from the wisdom of the fable for each of us individually, there is solemn warning for us as a nation. Some among us seem to believe that with an unlimited supply of taxpayers' dollars America can buy anything--ease and security at home, acceptance of our ideas abroad, friendship of other peoples, even world peace.

Like the vain frog, America inflates herself more and more dangerously, trying to stretch herself to be the biggest thing in the swamp. Meanwhile the enormous beast that is the world goes its own way, scarcely affected by the vainglorious display of America's inflation. It's the same old world that was indifferent before the pomp of Egypt, Persia, Greece and Rome.

How will our present "puffing" end? Isn't it obvious that continued inflation can bring disaster? Only by a realistic policy of living within our means--not trying to be bigger than we are--can America avoid the catastrophe of Aesop's foolish frog.

YOUR SCRAP IS NEEDED — YOUNGSTOWN

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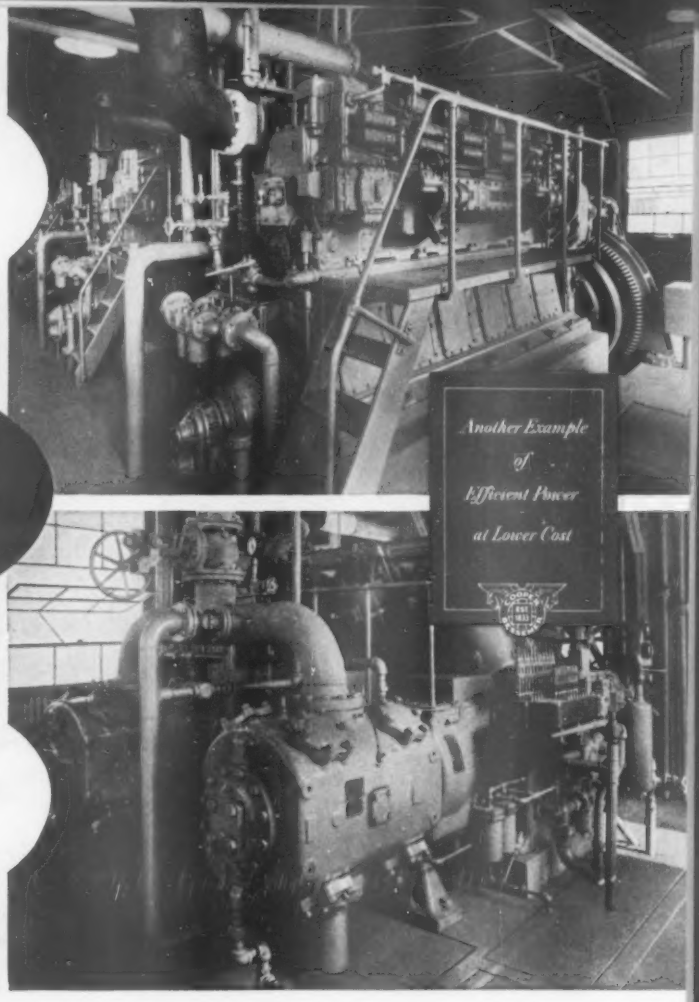
The steel industry is using all its resources to produce more steel, but it needs your help and needs it now. Turn in your scrap, through your regular sources, at the earliest possible moment

..for efficient power generation

..for low-cost compressing

Cooper-Bessemers ALL THE WAY



The new natural gasoline plant of the Hugoton Plains Gas and Oil Company, now operating about a year, is powered by the Cooper-Bessemer units shown above. These consist of three JS-6 540 hp gas engines driving 368 KW A.C. generators, and a 308 hp GMX V-angle compressor.

This interesting field processing plant, engineered and constructed by J. F. Pritchard & Company, serves 176 gas wells, operates without steam, and efficiently produces natural gasoline, propane, butane and iso butane. Residue gas goes into Northern Natural's system.

The three JS gas engines operate 24 hours a day, furnish all electric power required to operate the plant. Using Cooper-Bessemer's latest development in high compression operation, these modern engines attain 34.4% thermal efficiency, holding fuel consumption to less than 7400 BTU/bhp/hr.

The GMX is used as a propane refrigeration unit. And here, as in other processing services, this modern Cooper-Bessemer V-angle compressor is showing a consistent record of trouble-free, low-cost performance under continuous operation.

Whether your plans call for power generation, compressing, or both, check on the advantages you stand to gain with the latest Cooper-Bessemer developments.

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MOUNT VERNON, OHIO — GROVE CITY, PENNA.

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San Francisco Houston, Dallas, Greggton, Pampa and Odessa, Texas
Seattle, Wash. Shreveport, La. St. Louis, Mo. Los Angeles, Calif.
Caracas, Venezuela Gloucester, Mass. Tulsa, Okla. New Orleans, La.

Gulf Official

Huggins will assume vice presidency of two firms

R PAUL HUGGINS, the newly elected vice president of Gulf Oil Corp. and Gulf Refining Co., will assume his duties on September 15. He will take charge of crude-oil purchasing activities for the two companies at Houston.

Since 1947 he has been serving as vice president of Western Gulf Oil Co. in charge of California operations.

A native of Tennessee, Huggins is a veteran of 31 years with Gulf. He was educated in accounting and banking in Texas and was first employed in the transportation department of the G. C. & S. F. Railway. He served in the Army from 1917 to 1919 and was executive officer of the camp supply depot at Camp Taylor, Ky., when he was discharged.

Huggins joined Gulf's production accounting department in Houston in 1921. In 1928 he was transferred to California, where Western Gulf's first production had just been discovered.

He advanced from chief clerk to auditor and later became manager in 1936.

He is a director of the Western Oil and Gas Association, a member of the American Petroleum Institute central committee, and production department and central committee on training, and past chairman of the Conservation Committee of the California Oil Producers.

Jack Roach has been appointed manager of refinery operations for Kerr-McGee Oil Industries, Inc., Oklahoma City. He formerly was division gas superintendent for Stanolind Oil & Gas Co. at Fort Worth, and assistant refinery superintendent for Phillips Petroleum Co. at Borger, Tex. **Dr. Leo Garwin,** project leader in the company's research department since June 1951, has been named acting director of research. **Daniel R. Ketchum** has joined Kerr-McGee as senior construction engineer.

F. C. W. Paton has been appointed general manager of foreign marketing for Gulf Oil Corp. He had been serving as assistant to the late W. A. Berryman, vice president in charge of foreign marketing.

J. M. Pattinson, C.B.E., and **H. E. Snow,** C.B.E., have been appointed directors of Anglo-Iranian Oil Co. Pattinson, who was the company's general manager in Abadan during the last war, returned to the head office in London in 1945 and 4 years later was made a deputy director. Snow has been connected with the Anglo-Iranian group since 1921, and for the past 16 years has been a member of the company's distribution department, of which he became deputy director in 1946. Their appointments follow the resignation of **J. A. Jameson,** C.B.E., and **F. G. C. Morris.**

A. J. Herron has been appointed general manager of Australian Oil Refinery Pty., Ltd., in charge of operations of the new company. **R. W. Parker** has been appointed project manager in charge of all phases of design, field construction, and other activities related to the erection of the company refinery at Kurnell, Australia. Other appointments announced by the Caltex group, which operates mainly in the Eastern hemisphere, include: **W. G. Miller,** appointed project manager in charge of all activities related to the erection of the Caltex (Philippines) Inc., refinery at Batangas, and **L. D. Josephson,** appointed refinery manager for the Philippine firm.

R. W. PARKER

W. G. MILLER

Robert C. Rice has been promoted from junior engineer to engineer in the operating section at St. Louis of Standard Oil Co. (Ohio).

D. L. Yabroff, formerly on temporary assignment as manager of the manufacturing - research department of Shell Oil Co., New York, has rejoined Shell Development Co., Emeryville, Calif., as associate director of research. He will be in charge of chemical products, replacing Associate Director **K. R. Edlund,** who has been appointed special assistant to President **M. E. Spaght.**

William H. Farrand, general manager of the foreign producing department of The Texas Co. in the Western Hemisphere, has been elected a vice president of Rainbow Oil, Ltd. Previous positions include that of general superintendent of the Pacific Coast division for Texas, vice president and director of American Overseas Petroleum Co. and of Columbia Petroleum Co., both Texas affiliates, and manager of operations of the entire Texas foreign producing department.

Joseph J. Lawnick, junior exploitation engineer for Shell Oil Co. at Houston, has been promoted to exploitation engineer at Corpus Christi.

L. J. Richards, chief geophysicist for Hudson's Bay Oil & Gas Co., Ltd., at Calgary, Alta., has been promoted to assistant to the vice president and general manager of the firm. Hudson's Bay is the Canadian affiliate of Continental Oil Co. **E. L. Erickson,** regional geophysicist for Continental at Los Angeles, has been named to succeed Richards.

G. K. Chappell, plant superintendent for Phillips Petroleum Co. at Shidler, Okla., has been transferred to Midland, Tex., as superintendent of the Spraberry natural-gasoline plant, now nearing completion.

Raymond B. Kelly, Jr., district engineer for Sid Richardson Refining Co. at New Orleans, has been transferred to Fort Worth.

Peter Crosby has been elected president of a new company, Crosby Oil Corp. of Canada, at Toronto. **Raymond**

PERSONALS

G. Gaylor, New York, has been named chairman. The firm has holdings in Illinois, Indiana, Kentucky, and Texas, and will use a major portion of its United States revenue in Canadian development.

Kenneth G. Smith, formerly assistant superintendent for Interstate Oil Pipe Line Co. at Brookhaven, Miss., has been appointed district foreman at Heidelberg, Miss.

R. A. Hemingson, Rocky Mountain division manager for Calor Gas Co. at Great Falls, Mont., has been appointed Central Valley division manager at Fresno, Calif. **Richard Bond,** field engineer, has been named to succeed Hemingson.

Tom Quinn, former chief economist for Arabian American Oil Co., has resigned to join California Texas Oil Co., Ltd., in New York. He will be in the office of the financial vice president of the Caltex organization.

Robert Reusser, assistant professor of chemistry at Northeastern State College, Tahlequah, Okla., has been appointed analytical chemist for Cities Service Oil Co. at Ponca City, Okla.

P. K. WALLACE

P. K. (Doc) Wallace, assistant to the general superintendent of Oklahoma Natural Gas Co., has been appointed general superintendent. He succeeds **Carl E. Cloud,** who resigned recently to become president of Midsouth Gas Co., Little Rock, Ark. He joined the company in 1926 and has served as assistant superintendent of the Oklahoma district.

J. W. Jackson, formerly superintendent of Southern Areas for Anglo-Iranian Oil Co., Ltd., in Iran, has arrived in the United States to take charge of the new office which the company is opening in Calgary, Alta. Anglo-Iranian plans to make an extended survey of the Canadian oil situation through its subsidiary, D'Arcy Exploration Co., Ltd. Jackson was one of the last of the company's British staff to leave Iran after the properties were seized last year. The Southern Areas of which he was superintendent included Agha Jari field, which was the company's largest with an output of 310,000 bbl. daily.

Presenting 20-Year Pin at Billings

R. E. Boydson, second from right, mechanical superintendent at the Billings, Mont., refinery of Carter Oil Co., presents a 20-year pin to Enoch M. Gustafson, second employe in the refinery to receive a 20-year award. At left is I. J. Staid, Carter manager of manufacturing, and at right is R. W. Burns, refinery general superintendent.

W. F. Moore, former president of Arabian American Oil Co., has retired from active administrative service with the company and has taken up residence in Beirut, Lebanon.

J. V. Brubaker, superintendent of the Pure Oil Co. gasoline plant at Dollarhide, Tex., has been promoted to division gasoline superintendent at Fort Worth. **Howard Mays,** assistant superintendent, has been named to succeed Brubaker at Dollarhide.

John L. Hoard, vice president and chief geologist for Kirkpatrick Oil Co., Oklahoma City, has resigned to become an independent operator at Ardmore, Okla.

Ben J. Taylor has resigned as vice president and a member of the board of Kingwood Oil Co., Oklahoma City, to devote more time to his own production in the Illinois basin. To fill out Taylor's unexpired term directors elected **R. P. Lammerts** vice president, and **C. A. McKenzie** a member of the board.

J. P. Bristow, J. Leslie Witt, and **Joseph W. Hibben** have been added to the board of directors of Texas-Ohio Gas Co. Bristow formerly was vice president in charge of operations for Tennessee Gas Transmission Co., and later vice president of Fish Pipe Line Construction Corp. Witt is an executive of EMSCO Derrick & Equipment Co., and Hibben is a partner in charge of the Chicago office of Kidder-Peabody & Co., New York banking firm. **William A. Baker, Jr.,** has been named chief geologist of the company.

William N. Sorenson, who joined Sohio Pipe Line Co., St. Louis, as a junior engineer in 1949, has been promoted to senior engineer.

D. R. Lindsay, junior petroleum engineer for Shell Oil Co., has been transferred from Los Angeles to Ventura, Calif. Other company changes include: **D. S. Easton,** formerly head well puller at Brea, Calif., promoted to production foreman at Dominguez, Calif.; **H. F. Taylor** and **Paul D. Martin,** formerly drillers at Ventura, promoted to drilling foremen at Glendive, Mont.; **E. A. Ritzman,** drilling foreman, transferred from Bakersfield to Oilfields, Calif.; **Ward O. Abbott,** geologist, transferred from Grand Junction, Colo., to Salt Lake City, and **R. L. Knight,** junior geologist, transferred from Casper, Wyo., to Grand Junction.

Frank McMahon, president of Pacific Petroleums, Ltd., for 5 years, has been elected chairman of the board and chief executive officer. **George L. McMahon,** formerly executive vice president, has been elected president, **C. H.**

Let's Call Wire Rope Constructions

by their Right Names!

This is a message of importance to every user and purchaser of wire rope. It is information that will help eliminate much of the past confusion over wire rope terminology.

How did this confusion arise? Let's illustrate briefly. For years 6 x 19 has been just a name for a variety of six-strand ropes, few of which actually have 19 wires per strand. As an example, our popular 6 x 19 W has always contained 25 wires per strand; the 6 x 19 U, 21 wires per strand. The 6 x 19 Seale, on the other hand, really does have 19 wires in each of its strands. Until recently, the letter or name following the numbers denoted the actual construction; but many users did not know this, and the omission of these symbols occasionally resulted in costly misapplications.

To clarify matters in the various classes of rope, Bethlehem has revised the entire list of misleading designations. For instance, in the Bethlehem terminology, Type W rope is now designated—accurately—as 6 x 25 W (not 6 x 19); Type Q is 6 x 41 Q (not 6 x 37). This completely accurate terminology applies to each and every rope that Bethlehem makes.

Nothing has been changed but the designation. The ropes are made to the same high standards of Bethlehem quality. *Constructions are the same as in the past.* Only the names, the designations, are different. The numbers now mean what they say.

We earnestly solicit your help in publicizing this information. The transition now under way is one that has long been needed.

BETHLEHEM STEEL COMPANY
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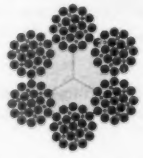
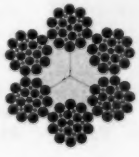
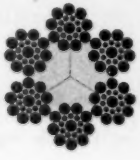
On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

6 x 25 Type W | 6 x 21 Type U | 6 x 19 Seale







Of these three ropes, Seale is the only one with 19 wires a strand. Yet for years all three types have been known as 6 x 19. This is not an isolated case. Similar instances occur in other classifications of rope.

PERSONALS

Wright has been elected a director, and **N. R. Whitall,** retiring chairman, will remain a director.

John A. Anderson has been appointed regional oil and gas supervisor of the Southwestern region, oil and gas leasing branch, conservation division, of the U. S. Geological Survey, with headquarters in Roswell, N. M. He formerly was deputy supervisor of the oil and gas leasing branch at Oklahoma City.

Harris Bateman, chief engineer for Cities Service Oil Co. (Del.), will join the Petroleum Administration for De-

BATEMAN

B. D. LEUTY

fense in Washington soon as head of the materials section. During his absence **C. S. Mitchell,** in addition to his duties as manager of crude-oil supply and transportation, will be in charge of the engineering division. **Ben D. Leuty,** Bartlesville, Okla., has been appointed chief engineer and will continue his position as assistant manager of the engineering division in charge of affiliated pipe lines.

Sidney A. Swensrud, Pittsburgh, Pa., president of Gulf Oil Corp., will be chairman of a September drive in the petroleum industry to increase systematic savings in U. S. defense bonds among the nation's oil workers.

Richard C. Marmaduke, formerly district geologist for Carter Oil Co. at Shreveport, La., has joined British-American Producing Co. at Dallas as a staff geologist.

James R. Wood, engineer for Standard Oil Co. of Texas, has been transferred from Snyder to Midland, Tex.

N. V. Duncan, Fairfield, Ill., has joined the geological staff of Slayter Producing Co. at Evansville, Ind.

Thorold E. Roberts, engineer for National Cooperative Refinery Association at McPherson, Kans., has been transferred to Great Bend, Kans., as assistant engineer in the production division.

Robert W. Grunert, former secretary and controller, has been elected president and chief administrative officer of South Penn Oil Co. **George J. Hanks** has been named chairman of the board and chief executive officer. Grunert also was elected to the board of directors to fill a vacancy created by the resignation of **Lynn G. Smith.**

Leon Joe Abrusley, production engineer for Skelly Oil Co., has been transferred from Skellytown to Carthage, Tex.

Edward S. Bale, manager of the Latonia, Ky., refinery for Standard Oil Co. (Ohio) since 1949, has been appointed chief of the refining control division at Sohio's home office in Cleveland. Other company appointments, effective September 1, include: **Forest G. Brown,** manager of Sohio's No. 2 refinery and lithograph can factory at Cleveland, appointed manager of the Latonia refinery; and **H. P. Ferguson,** chief of the refining control division, appointed to succeed Brown.

George L. Robinson has been elected vice president of Buckeye Pipe Line Co. He formerly was manager of the eastern products division and will continue to be located in Allentown, Pa. He has been with Buckeye since 1932. Before his transfer to Allentown, he was general superintendent of the company's lines throughout Indiana, Illinois, Michigan, and Ohio.

Albert G. Sledge, Jr., production engineer for Skelly Oil Co. at Carthage, Tex., has been promoted to petroleum engineer at Shreveport, La.

DEATHS

Charles Drake, 87, associated with South Penn Oil Co. for 40 years prior to his retirement in 1929, died July 27 at Waterford, Ohio. A distant relative of Col. Edwin L. Drake, he was graduated from Ohio Northern University as a civil engineer in 1889, and surveyed field areas in southwestern Pennsylvania and West Virginia during the heyday of the early eastern oil development. He was superintendent of the engineering department of South Penn Oil at the time of his retirement.

Harry Maxwell, 60, former manager of industrial relations for Sun Oil Co., Philadelphia, died at his home in Fort Lauderdale, Fla., August 9.

Cecil Meltabarger, 38, manager of the Manitoba zone for McColl-Frontenac Oil Co., died August 6 in Winnipeg, Man.

Frank McBee, a retired driller, died July 26 in a Long Beach, Calif., hospital.

Cecil M. Finn, 52, Brentwood, Calif., personnel director for Superior Oil Co., and **Bascomb Lang,** 38, Midland, Tex., central division personnel director, Lafayette, La., were killed August 8 in a plane crash near Bluemont, Va.

Glen Kahle, 71, formerly an independent operator at Dallas, died August 1 at his home in Knox, Pa. His early activities in the oil industry were in Illinois, Oklahoma, and Montana.

Ward P. Anderson, 50, general manager of the refining division, eastern operations, for California Texas Oil Co., died August 12 at his home in Larchmont, N. Y. He began his career in 1925 when he joined Standard Oil Co. of California.

Ulysses Pary Barrett, 76, retired driller, died recently in a Long Beach hospital.

John Evans Sloan, 60, one of the original incorporators of the Black Steel & Wire Co., Kansas City, which is now Union Wire Rope Co., died August 3 in a Tulsa hospital. At the time of his death he was associated with Rollans & Elliott Wire Rope Co., Tulsa.

Fred H. Matthews, 57, manager of the crude and products department and a member of the Western division operating committee of Tide Water Associated Oil Co., died at his home in Oakland, Calif., recently.

Theodore Bockman, chemical engineer for Universal Oil Products Co. for nearly 18 years, died recently in Chicago.

Tom Hincy, 84, drilling contractor, died August 7 at his home in Alexandria, La.

Years of Experience
Assure Success of

HALLIBURTON'S *original* HYDRAFRAC *Service*

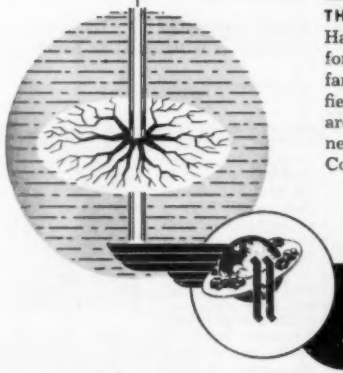
Years of Hydrafrac treatment have furnished Halliburton Engineers with an impressive volume of data. This information—based on *sustained* production increases from treated wells in numerous fields and formations—has resulted in highly successful Halliburton techniques.

for example...

IT IS KNOWN THAT *SELECTIVE* THIN ZONE FRACTURING produces new and greater effective permeability within the producing formation without fracturing at undesired levels. Zone isolation is aided by cementing the casing shoe well within a sand body and also plugging back excessive hole with plastics and cements.

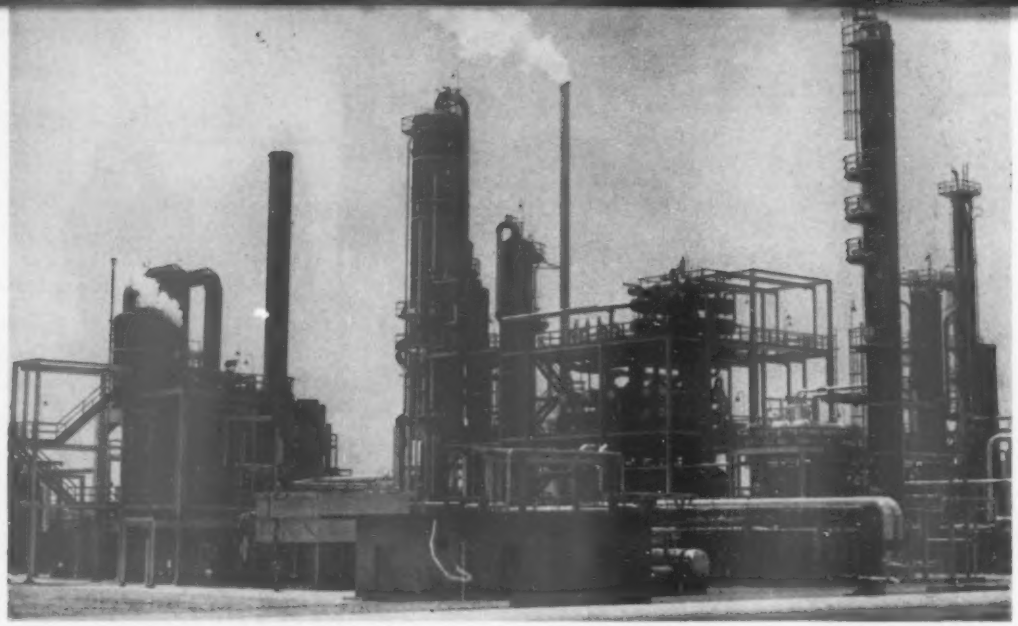
Where casing is set through and perforated, formation selection is largely dependent on the quality of the cementing job behind the pipe. Better mud control, an increase in the use of mechanical wall cleaning devices and casing centralizers, and mixing of larger quantities of proper cements have had a noticeable effect on the successful completion of Hydrafrac jobs.

THERE IS NO SUBSTITUTE FOR EXPERIENCE! The amazing success of Halliburton Hydrafrac Service in many widely separated fields and different formations proves the value of experience. Only an engineer who is thoroughly familiar with all past experience as well as today's approved techniques is qualified to select wells for successful Hydrafrac treatment. Halliburton Engineers are available around the clock for consultation and detailed planning. Phone your nearby Halliburton Representative, or contact Halliburton Oil Well Cementing Company, Duncan, Oklahoma.



HALLIBURTON

YEARS AHEAD IN PRODUCTION IMPROVEMENT TECHNIQUES!



NEW CRUDE UNIT at Phillips' Sweeny, Tex., refinery has aided in upping plant's throughput from an original 25,000 bbl. per day to present 70,000 bbl. daily. New unit has operated as high as 26 per cent over design capacity.

Wartime Capacity of Refinery Is Trebled . . .

Phillips' Sweeny plant near 70,000 bbl. daily

by E. Strunk

COMPLETION of a major expansion program at Phillips Petroleum Co.'s Sweeny, Tex., refinery has increased the nominal crude capacity to approximately 70,000 bbl. per day, or near three times the original capacity of the plant which was built during World War II.

Expansion of the refinery took place under two major programs along with a continuing program incorporating minor changes. The initial program involved the extensive conversion of the plant to peacetime refining activities and included an increase of crude capacity from about 25,000 to approximately 40,000 bbl. per day. The recent expansion, which included a new crude unit, raised the crude capacity to its present level.

Other work included the rehabilitation of the hydrofluoric acid alkylation unit, conversion of the terminal reformer to a utility unit, and modification of the catalytic cracking unit.

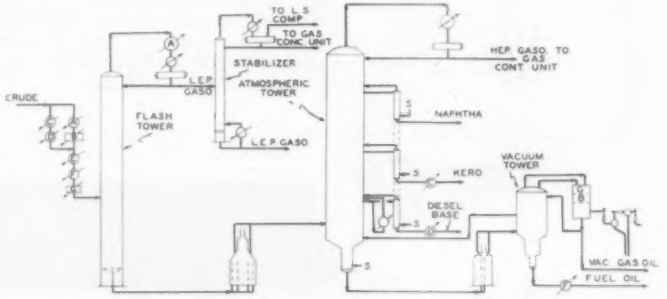
Crude Units

Several innovations were made to the original crude unit which permitted an increase in throughput, a more diversified yield of products, and a segregation of crude types being charged to the unit. The original design was made on low-end-point base stock, reforming stock, gas oil for cat cracker feed, and vacuum residuum for fuel oil.

Throughput upped . . . Two series of changes were made to the original crude unit which upped the charge capacity stepwise from about 25,000 to approximately 40,000 bbl. per day. In the first step, minor revisions were made to the unit including improved heat-exchanger arrangement which allowed a 20 per cent increase in charge.

The second rise in capacity involved a novel, but effective, method of easing the load on the flash tower by increasing the size of the atmospheric tower (see Fig. 1). This was accomplished by cutting off the top of the atmospheric tower and adding an eight-tray extension to its topmost section. The improved fractionation and accompanying preheat revisions allowed the entire crude unit to operate at a greatly increased rate.

Crude segregation . . . The crude unit was originally designed to handle pre-



NEW CRUDE UNIT flow chart at Phillips' Sweeny refinery. Fig. 1.

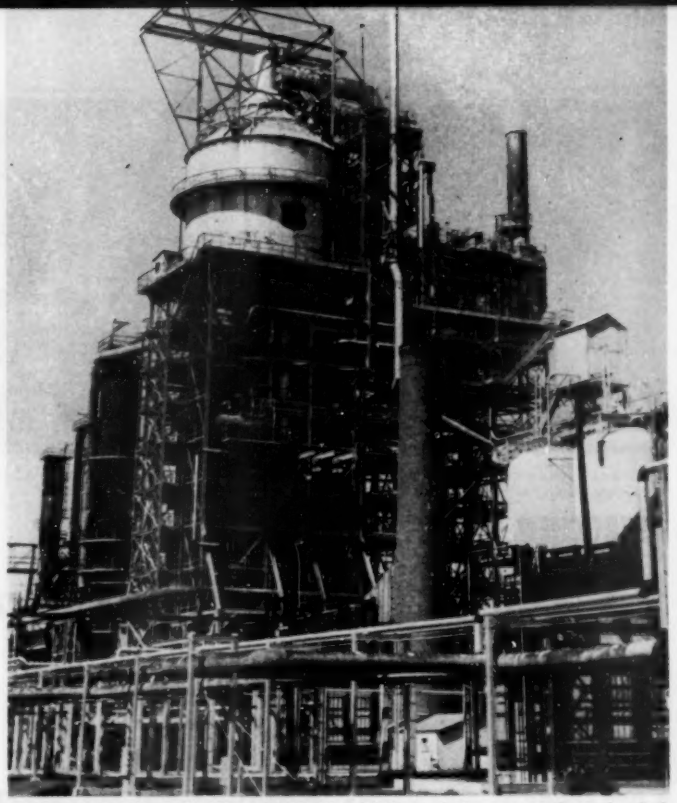
dominantly light crude with no segregation of types. However, when heavy, naphthenic crudes were being charged to the unit, the production of acceptable quality diesel fuel and kerosine was considerably hampered.

To improve the operation, provision has been made at the plant to segregate incoming paraffinic and naphthenic crudes and then charge the streams separately to the crude unit. The paraffinic crude is charged to the flash tower and kerosine and diesel-fuel strippers have been added. The naphthenic crude then is added to the bottoms of the flash tower and the combined stream charged to the atmospheric tower from which gas-oil distillates are removed as required.

The addition of distillate strippers and the improved fractionation with the extension of the atmospheric tower have made possible an increased range of products from the plant.

New crude unit . . . The new crude-distillation unit was placed on stream in September 1951 and has since operated as high as 26 per cent over design capacity. The new unit is a modernized version of the original crude unit, with crude preheated and sent to a flash tower and includes a low-end-point gasoline stabilizer. An atmospheric tower is operated with three sidecut streams. A dry-vacuum tower completes the unit.

Utility unit . . . One of the original units designed as a reformer has been converted to a utility unit which enables it to augment the refinery crude-distillation capacity. This unit operating on crude has double its capacity as a reforming unit. A small vacuum still, added to handle its residuum, is arranged so that it may be run in parallel or series with the original crude-unit vacuum tower. The unit may also be alternated as a thermal cracker to operate on recycle or once-through cracking and can be used to crack distillates, gas oil, or catalytic cycle oil, or may be used for visbreaking residuum.

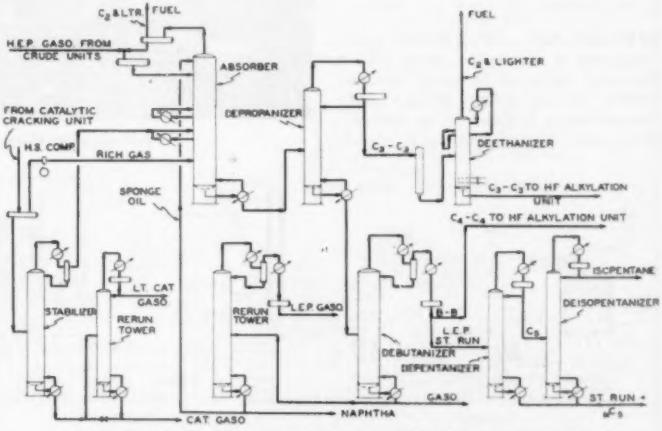


ORIGINAL FLUID CATALYTIC CRACKING UNIT at plant was a wartime unit principally designed for production of aviation-gasoline base stocks. Subsequent modifications have raised efficiency and provided for 50 per cent increase in motor-fuel production capacity.

Revisions to this unit included the addition of two side strippers, additions and changes to the heat-exchange system, enlargement of the fuel-oil flash system, and addition of a crude preflash unit.

The fluid catalytic cracking unit, a part of the original refinery, was a wartime unit designed principally for the production of aviation gasoline base stocks. Reactivation of this unit on the basis of motor-fuel production resulted in an increased capacity of nearly 50 per cent. Other modifications made during subsequent operation have appreciably improved operating efficiency. Major changes include optimum

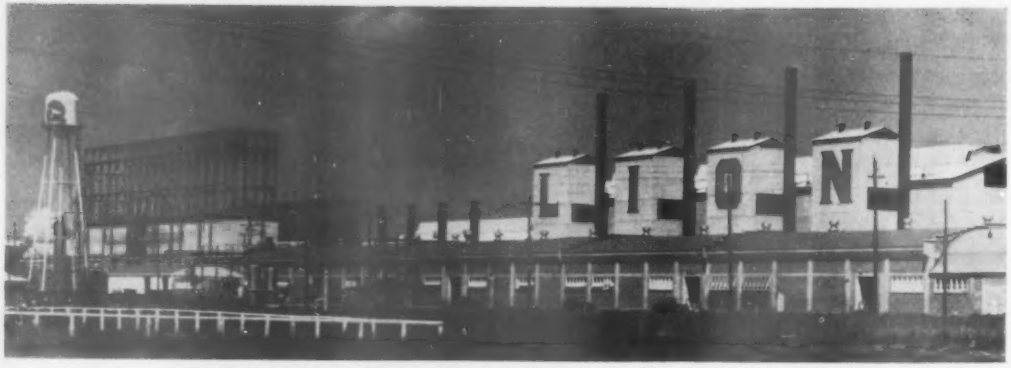
(Continued on page 139)



GAS-CONCENTRATION UNIT flow chart at Phillips' Sweeny refinery. Fig. 2.

THE AUTHOR

E. Strunk is resident engineer of the Sweeny, Tex., refinery of Phillips Petroleum Co. He has held this position since 1949. Prior to that time, he was process engineer at the Kansas City and Phillips, Tex., refineries, and at Bartlesville. He also worked in the design section at Bartlesville. Strunk graduated from University of Oklahoma in 1941 with a degree of bachelor of science in chemical engineering.



CHEMICAL PLANT of Lion Oil Co. at El Dorado, Ark., taken from the entrance road.

PETROCHEM REPORT:

Lion Chemical Co., El Dorado, Ark.

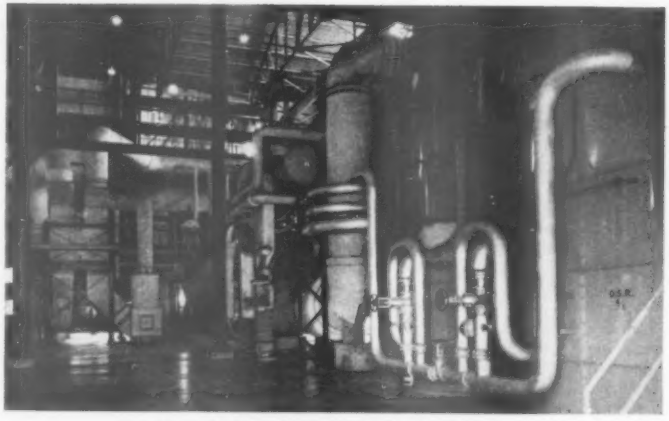
New ammonia plant, to be erected near New Orleans, is in early planning stage

by F. Lawrence Resen
Gulf Coast District Editor

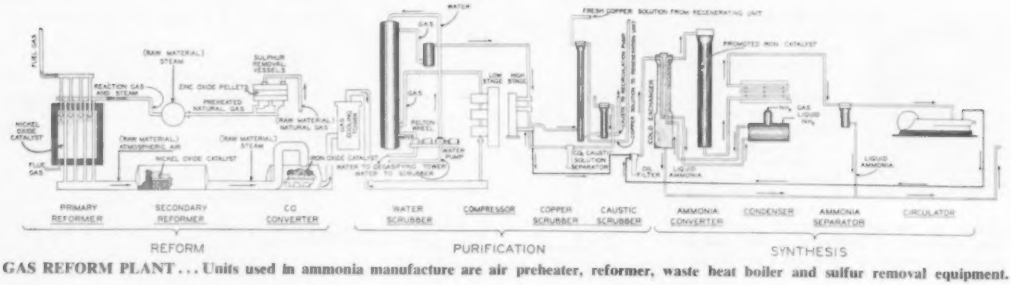
LION CHEMICAL CO.'S projected $31,000,000 ammonia plant near New Orleans is the latest and largest undertaking by this completely owned subsidiary of Lion Oil Co.

Like the main plant at El Dorado, Ark., the new installation will utilize natural gas as a raw material and fuel to produce 300 tons of anhydrous ammonia daily, most of which will be converted to ammonium nitrate. In addition, nitrogen-manufacturing facilities will be installed which will increase the company's capacity by approximately 53 per cent.

El Dorado plant . . . With the new plant, designated as the Barton plant, still in the early stages of planning, most attention naturally centers around Lion's petrochemical facilities at El Dorado. There, almost 40,000,000 cu. ft. of nat-



Ammonia plant, chemical division of Lion Oil Co.



GAS REFORM PLANT . . . Units used in ammonia manufacture are air preheater, reformer, waste heat boiler and sulfur removal equipment.

ural gas is consumed daily and more than 3,000 tons of chemical products are produced each day.

Current balanced production capacity provides the following daily volumes of products: anhydrous ammonia, 570 tons; nitric acid, 475 tons; ammonium nitrate solution, 593 tons; nitrogen fertilizer solutions, 345 tons; pelleted nitrate fertilizer, 400 tons; sulfuric acid, 290 tons; and ammonium sulfate fertilizer, 350 tons.

As can be seen from the production schedule, most of the products are used in agriculture for the purpose of enriching top soil. Prime component in the fertilizers is ammonia, which is combined with nitric acid and sulfuric acid to form ammonium nitrate and ammonium sulfate.

Using basic raw materials of natural gas, air, and water, ammonia is manufactured continuously by following three principal processing steps—gas reforming, purification, and synthesis.

Gas reforming . . . The gas-reform step prepares the process gas from which anhydrous ammonia is made. Natural gas is passed through sulfur-removal vessels containing zinc oxide pellets and is then reacted with steam in the presence of nickel oxide catalyst. The hydrogen, carbon monoxide, and carbon dioxide resulting from this step travel to the secondary reformer where nitrogen, in the form of atmospheric air, is added.

The gas mixture proceeds to the carbon monoxide converter where carbon monoxide is reacted with steam in the presence of iron oxide catalyst to produce additional hydrogen. The entire mixture of gases then enters a gas-cooling tower before reaching the purification stage. The process gas coming out of the reform step contains the required one-to-three ratio of nitrogen and hydrogen in addition to carbon dioxide and carbon monoxide impurities.

Purification . . . The purification process is composed of two principal operations, each of which has definite heat and pressure requirements. The process gas is first compressed to 220 psi. and passed through either a water-scrubbing tower or a Girbotol unit containing MEA (monoethanolamine) solution to remove carbon dioxide. Water from the scrubber is sent to the degasifying tower where the pressure is released and the carbon dioxide vented to the atmosphere. The MEA solution returns to its regenerator.

Another pass through compressor units brings the process gas to scrubbing towers where carbon monoxide is removed by copper liquor — cuprous

(Continued on page 137)

What It Takes To Operate Lion Chemical Co.'s El Dorado Petrochemical Plant

MAJOR OPERATING FACILITIES

AMMONIA PLANT:

1. Gas reforming division, consisting of four independent units.
2. Compression division, consisting of 29 Cooper-Bessemer and 1 Clark 1,000-hp. gas-engine-driven compressors.
3. CO_2 purification division, comprised of a water-purification system and MEA system. The water system has eight large water scrubbers to which water is fed by centrifugal pumps driven by eight 1,000-hp. Worthington gas engines. The water is circulated through specially designed degasifying towers. The MEA system is a chemical operation handling approximately 25 per cent of the purification requirements for the plant.
4. Copper liquor and caustic purification division.
5. Refrigeration division powered by seven Worthington gas engines capable of producing refrigeration equivalent to that required to produce 4,200 tons of refrigeration.
6. Ammonia synthesis division, consisting of 9 ammonia converter units to which a constant pressure is maintained by 11 Worthington steam-driven circulating pumps.
7. Anhydrous ammonia storage—10 Hortonspheres with a total capacity of 8,400 tons of anhydrous ammonia.
8. Anhydrous ammonia loading racks, tank scales, and loading equipment.

NITRIC ACID PLANTS:

1. Nitric acid plant No. 1, with a daily capacity of approximately 350 tons.
   (a) Air compression division, consisting of six air compressors with an estimated capacity of 35,000 cu. ft. per minute.
   (b) Six ammonia oxidation units.
   (c) Three nitric acid absorption units.
   (d) Stainless steel storage of 260 tons capacity.
2. Nitric acid plant No. 2, with a daily capacity of approximately 150 tons.
   (a) Air compression division, consisting of eight air compressors with an estimated capacity of 15,000 cu. ft. per minute.
   (b) Three ammonia oxidation units.
   (c) Three nitric acid absorption towers.

AMMONIUM NITRATE SOLUTION PLANT:

1. Two nitric acid neutralization units.
2. 83 per cent ammonium nitrate solution storage capacity, 17,500 tons.
3. Ammonium nitrate solutions loading rack and equipment.
4. Ammoniated solutions plant, consisting of three units with capacity of six 30,000-gal. aluminum pressure vessels.

UTILITY FACILITIES:

1. Steam-generating equipment with maximum capacity of 590,000 lb. per hour.
2. Electricity generating equipment with maximum capacity of 16,000 kw.
3. Cooling water facilities with circulating capacity of 226,000 g.p.m.
4. Eleven water wells with a capacity of 3,500 g.p.m.

MAINTENANCE SHOPS:

1. Machine, instrument, welding, carpenter, paint, and salvage shops.

RAILROAD EQUIPMENT:

1. One 60-ton diesel locomotive and one gasoline locomotive; approximately 7½ miles of track; railway loading docks; and a fleet of owned and leased railway tank cars.

LABORATORIES:

1. Four plant-control laboratories.
2. General company research.

PELLETING PLANT:

1. Two neutralizing facilities.
2. Bagging facilities.
3. Vacuum distillation units.
4. Two 120-ft. "shot towers."
5. Cooling, drying, and conditioning units.
6. Conveyor facilities.
7. Clay-handling equipment and storage.

SULFURIC ACID PLANT:

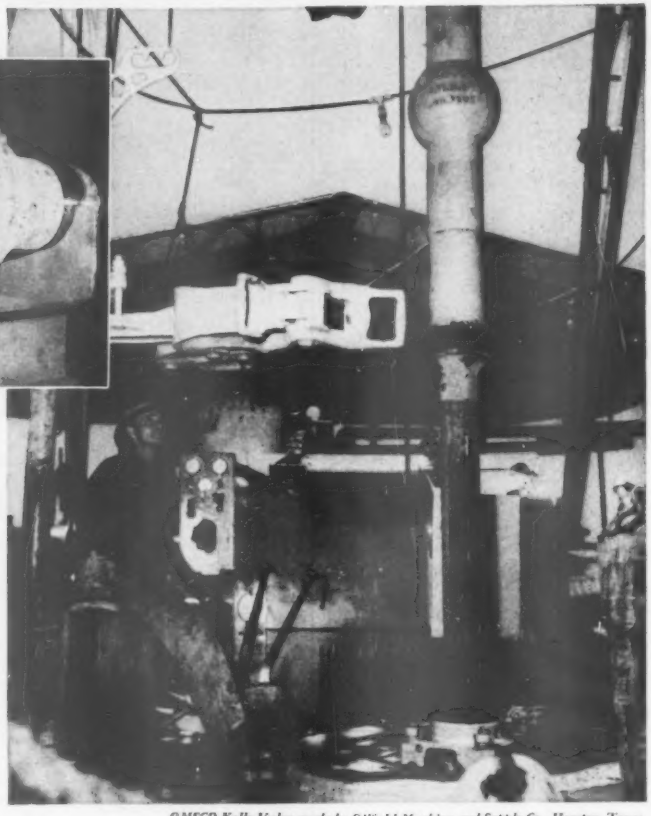
1. One burner unit, contact process, 300-ton daily capacity.
2. Sulfur loading bin.
3. Sulfuric acid storage—two tanks with 2,000 tons capacity.
4. Sulfur storage.
5. Sulfuric acid tank car and truck loading facilities.

AMMONIUM SULFATE PLANT:

1. Three neutralizing units, 380 tons daily capacity.
2. Three centrifuge units for removing solids.
3. Drying and clay coating facilities.
4. Conveyor and bagging facilities.
5. Loading facilities and silo storage.

Another new development using

B. F. Goodrich Chemical *raw materials*



It keeps wells from blowing their tops—

AND HYCAR HELPS!

OMSCO Kelly Valve made by Oilfield Machine and Supply Co., Houston, Texas. B. F. Goodrich Chemical Co. supplies the Hycar rubber only.

THAT Kelly Valve is A-1 insurance against a blowout through the drill pipe—and its Hycar-packed ram is a vital aid in protecting the investment in costly drill hole and drilling machinery.

Even with the ram in full open position, the packing is exposed to the drilling fluid. Oil and gas attack it. When the ram is closing, the packing meets the full abrasive force of the drilling fluid. Non-oil-resistant packing would deteriorate quickly. But not Hycar rubber—for Hycar resists oil, gas and abrasion . . . provides long-lived protection.

Hycar rubber compounds have many uses in the petroleum and in other industries. They have advantages that you may find highly useful in many applications. Hycar resists heat and cold, weather, abrasion, oil, gas and many chemicals. It retains its flexibility and resilience under extreme temperatures.

One of the many versatile Hycar rubber compounds may help you improve or develop more saleable products. Technical advice is yours for the asking. Just write Dept. HI-9, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio. In Canada: Kitchener, Ontario. Cable address: Goodchemco.

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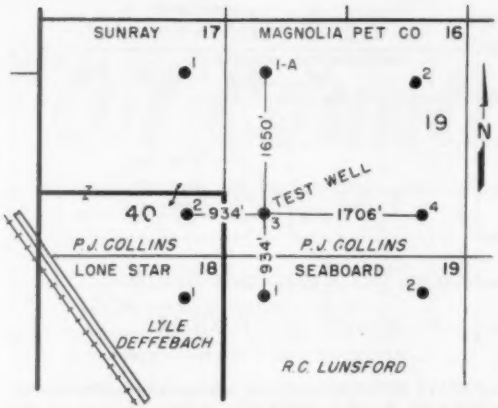
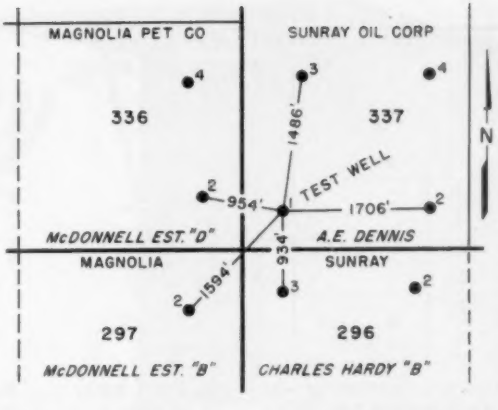


SURFACE LOCATION of wells offsetting 3 P. J. Collins well, Kelly-Snyder area. Fig. 4.



WELL LOCATIONS offsetting 1 A. E. Dennis well, Kelly-Snyder area. Fig. 6.

Well-Interference and Pressure-Buildup Tests—2

. . . on wells in Scurry reef field in Texas

by R. V. Smith,* R. H. Williams,* E. J. Dewees,* and F. G. Archer*

PART 2 OF TWO PARTS

WELL-INTERFERENCE and pressure-buildup tests have been completed for seven wells in the Scurry reef field, to determine effective permeability in the reservoir and its suitability for pressure maintenance.

Methods and procedures used in these studies were described in Part 1, published last week.

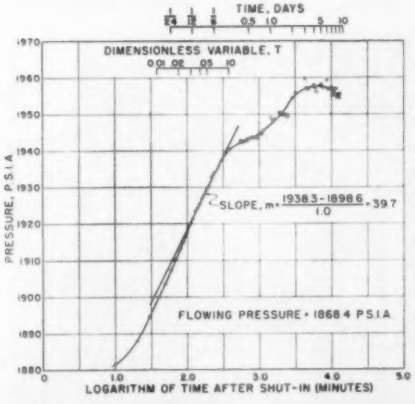
The tests on the other six wells were conducted in essentially the same manner as those described both in the preceding section of this report for the 8 Wright Huddleston well and in a separate report[2] giving the details of the tests on the 6 R. W. Webb well. However, data for the Webb well are given again in this report.

With the test well flowing, subsurface pressures and temperatures measured immediately before the well was closed in and temperatures measured after shut in are given for the 3 P. J. Collins, 1 A. E. Dennis, 4 H. J. Schulze, 6 R. W. Webb, 2 G. H. Ariedge "B," and 3 A. B. Ficke wells. Subsurface pressures were measured at the lowest depth for the various time intervals in the shut-in wells.

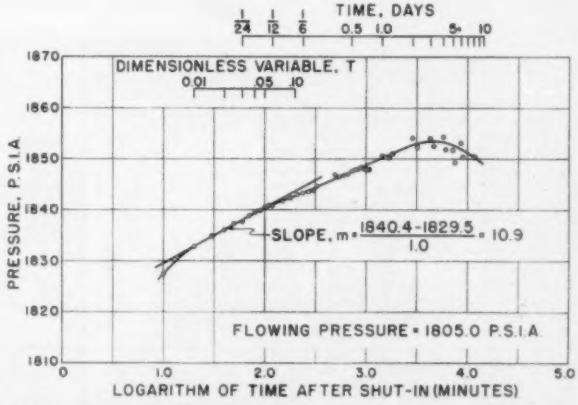
*Petroleum Experiment Station, Bureau of Mines, Bartlesville, Okla.

No. 3 P. J. Collins Well

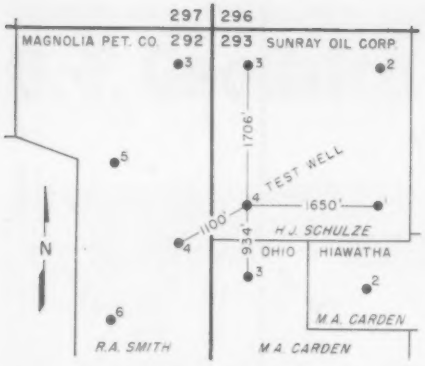
The surface location of wells offsetting the 3 Collins well is shown in Fig. 4. The two closest offset wells were about 934 ft. from the test well. One of these offset wells was producing at an approximate daily rate of 145 bbl. of stock-tank oil throughout most of the test. Unfortunately, none of the offset wells produced continuously or at a constant rate during the test period on the 3 Collins well because the operators were conducting special potential tests for the Texas Railroad


TIME, DAYS
1/24 1/12 1/6 0.5 1.0 5 10
DIMENSIONLESS VARIABLE, T
0.01 0.02 0.05 1.0
PRESSURE, P.S.I.A.
1970 1960 1950 1940 1930 1920 1910 1900 1890 1880
SLOPE, m = 1938.3 - 1898.6 / 1.0 = 39.7
FLOWING PRESSURE = 1868.4 P.S.I.A.
0 1.0 2.0 3.0 4.0 5.0
LOGARITHM OF TIME AFTER SHUT-IN (MINUTES)

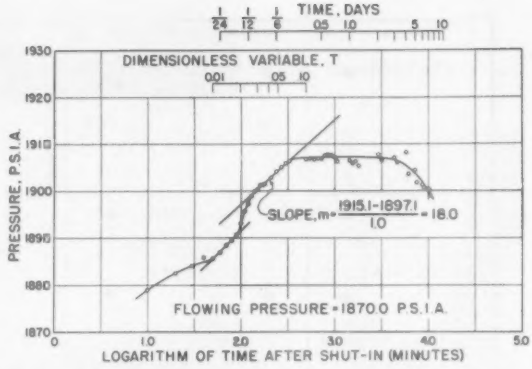
SUBSURFACE PRESSURES measured during pressure buildup and well-interference tests, 3 P. J. Collins. Fig. 5.


TIME, DAYS
1/24 1/12 1/6 0.5 1.0 5 10
DIMENSIONLESS VARIABLE, T
0.01 0.05 1.0
PRESSURE, P.S.I.A.
1870 1860 1850 1840 1830 1820 1810
SLOPE, m = 1840.4 - 1829.5 / 1.0 = 10.9
FLOWING PRESSURE = 1805.0 P.S.I.A.
0 1.0 2.0 3.0 4.0 5.0
LOGARITHM OF TIME AFTER SHUT-IN (MINUTES)

WELL PRESSURES measured during pressure-buildup and well-interference tests, 1 A. E. Dennis well. Fig. 7.



SURFACE LOCATION of wells offsetting 4 H. J. Schulze well, Kelly-Snyder area. Fig. 8.



SUBSURFACE PRESSURES measured during pressure buildup and well-interference tests on 4 H. J. Schulze well. Fig. 9.

Commission. The 3 Collins well, completed with 5½-in. casing, was producing at a test rate of 163 bbl. of stock-tank oil per day for 7 days before it was shut in. The flowing fluid of the Collins well was single-phase (liquid) oil, as the pressures observed were above the saturation pressure of the reservoir oil and the well did not produce water. The pressures measured during the buildup and interference tests are shown in Fig. 5, where pressure is plotted against the logarithm of time.

The straight-line section of the buildup curve (Fig. 5) indicates an effective permeability of 4.6 md. for the reservoir formation in the vicinity of the Collins well. The straight-line section of the curve began at T = 0.03 and ended at T = 0.08 (Table 2), meeting the T limitations of the test. After the straight-line section of the curve, the pressures increased, first slowly and then suddenly, to a maximum of approximately 1,958 psia. in 110 hours after shut in. No definite conclusions can be drawn from this part of the buildup curve because several of the offset wells were shut in and then produced at high rates during this period. After the pressure increased to a maximum in 110 hours after shut in, the pressure decreased about 3.0 psi. in the following 106 hours, showing that the reservoir around the 3 Collins well was interconnected. No highly permeable channels were indicated between the 3 Collins well and the offset wells.

No. 1 A. E. Dennis Well

The surface locations of wells offsetting the 1 A. E. Dennis well are shown in Fig. 6. The closest offset well was approximately 934 ft. south of the Dennis well and was producing at a steady rate of about 109 bbl. of stock-tank oil per day throughout the test period. Also, the remaining offset wells were producing oil continuously at comparable rates. The 1 Dennis well, completed with perforated 5½-in. casing, was produced at a test rate of 170 bbl. of stock-tank oil per day for 9 days before shut in. The flowing pressure (1,805 psia.) at a point near the bottom of the well was probably slightly below the saturation pressure of the reservoir oil, but the pressure became greater than the saturation pressure immediately after the well was shut in. As conditions indicate that the flowing pressure dropped below saturation pressure approximately at the sand face, the authors believe that the pressure-buildup curve in Fig. 7 represents approximately single-phase (liquid) oil flow.

The straight-line section of the buildup curve (Fig. 7) indicates an effective permeability of 36 md. for the reservoir in the vicinity of the Dennis well, the highest permeability indicated by tests in the Scurry reef. The straight-line section of the buildup curve met the T requirements, as the straight line began at T = 0.01 and ended at T = 0.055. After the straight-line section of the curve pressures increased gradually and evenly to a maximum of 1,853 psia. in 78 hours after shut in and then decreased about 3 psi. in the following 120 hours. This decrease in pressure indicates that the reservoir around the 1 Dennis well is interconnected with the closest offset wells. No highly permeable channels were indicated between the Dennis well and the offset wells.

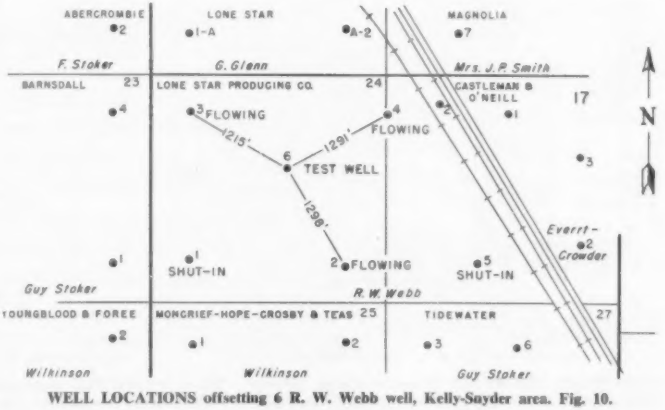
No. 4 H. J. Schulze Well

The spacing of the offset wells to the 4 Schulze well as shown in Fig. 8 was irregular. The closest offset well was approximately 934 ft. south of the Schulze well. All offset wells were producing continuously at a rate of approximately 100 bbl. of stock-tank oil per day. The 4 Schulze well produced at a test rate of 187 bbl. of stock-tank oil per day for 10 days before shut in. The flowing pressure (1,870 psia.) measured immediately before the well was shut in was considered to exceed the saturation pressure of the reservoir oil. Therefore, the pressure-buildup curve in Fig. 9 represents single-phase (liquid) oil flow.

The straight-line section of the buildup curve (Fig. 9) was unusual in that two distinct straight lines are possible, both of which meet the T requirements and have approximately the same slopes, 19.5 and 18.0. The line at the lower pressures (slope = 19.5) gives an effective permeability of 12.3 md. and the upper line (slope = 18.0) gives an effective permeability of 13.4 md. The authors believe that the difference in permeability is well within the experimental error of the methods and that the line was displaced vertically at 1,891 psia. by a change in some property of the reservoir or its fluids not included in Equation 1 or some other property of the reservoir. Rothrock[6] has found that the reservoir around the Schulze well is divided into two zones by a zone of low effective permeability. This separation of the reservoir may be significant, but the exact cause of the unusual pressure buildup curve is not known. The pressure, after the straight-line relationship between pressure and the logarithm of time, remained constant at 1,907 psia. for about 60 hours. The relatively constant pressures continued for about 66 hours after shut in, after which the pressure decreased approximately 8 psi. in the following 108 hours, indicating that the reservoir is interconnected between the 4 Schulze well and offset wells. No highly permeable channels were indicated between the Schulze well and the offset wells.

No. 6 R. W. Webb Well

The data and the results obtained on the



WELL LOCATIONS offsetting 6 R. W. Webb well, Kelly-Snyder area. Fig. 10.

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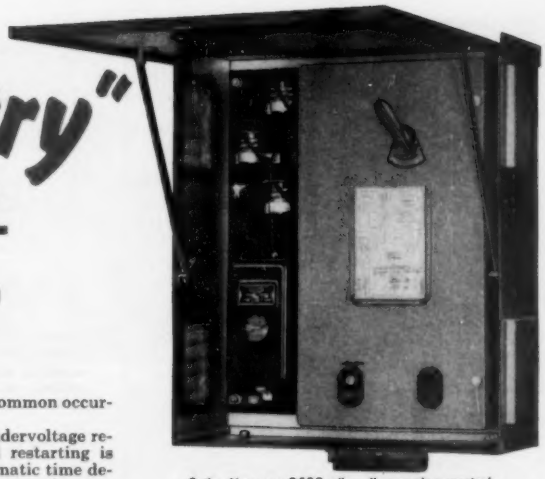
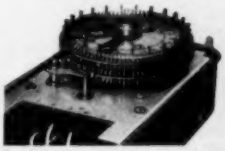


Cutler-Hammer 9589 oil well pumping controller with 3 coil overloads and time delay relay.



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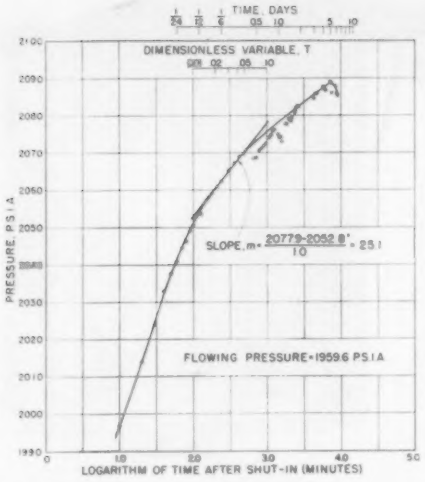
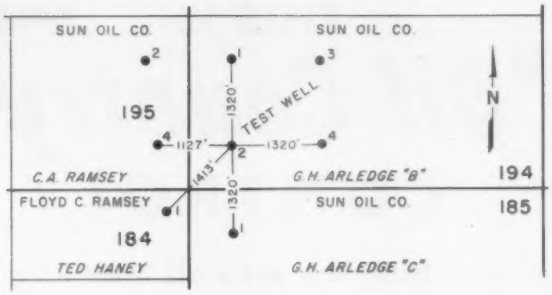

TIME, DAYS
1/24 1/12 1/6 0.5 1.0 5 10
DIMENSIONLESS VARIABLE, T
0.01 0.02 0.05 1.0
PRESSURE, P.S.I.A
SLOPE, m = 20779 - 2052.8 / 10 = 25.1
FLOWING PRESSURE = 1959.6 P.S.I.A
LOGARITHM OF TIME AFTER SHUT-IN (MINUTES)

SUBSURFACE PRESSURES measured during pressure-buildup and well-interference tests on 6 Webb well. Fig. 11.



SURFACE LOCATION of wells offsetting 2 G. H. Arledge "B" well, Diamond "M" area. Fig. 12.

6 R. W. Webb well have been discussed in detail in a previous publication[2] and are presented briefly in this report to provide complete coverage of the pressure-buildup tests in the Scurry reef. The surface locations of the 6 Webb well and offset wells and the pressure-buildup curve are shown in Figs. 10 and 11. The slope of the straight-line section of the buildup curve indicated a permeability of 8.2 md. using a productive-formation thickness of 165 ft. The pressure then increased in 5 days after shut in to a maximum of 2,089 psia., which was followed by a slight decrease during the limited time available for observation. No highly permeable channels were indicated between wells.

No. 2 G. H. Arledge "B" Well

The spacing of the offset wells to the 2 G. H. Arledge "B" well and distances are shown in Fig. 12. The closest well was approximately 1,127 ft. west of the test well. During testing of the Arledge well, the offset wells were producing continuously at a daily rate of approximately 75 to 80 bbl. of stock-tank oil. The 2 Arledge "B" well, completed with 4¾-in. open hole, produced at an approximate daily rate of 141 bbl. of stock-tank oil through a 13.5/64-in. positive choke for 3 days before shut in. Before this, the well had been producing through a 12.5/64-in. choke for about 10 days.

The flowing pressure of 1,926 psia., measured near the bottom of the 2 Arledge "B" well in the Diamond "M" area, was probably very near the saturation pressure of the reservoir oil, but all of the pressures measured after the well was shut in were definitely above the saturation pressure. The pressures measured during the buildup and interference tests are shown in Fig. 13. The pressure increased rapidly and shows the straight-line relationship between pressure and the logarithm of time in an hour after shut in. The straight-line section of the buildup curve continued for a very short period; it began at $T = 0.010$ and ended at $T = 0.016$. Using a net productive thickness of 49 ft. estimated from a MicroLog, the slope of the unusually short, straight line indicated an effective permeability of 6.8 md. The causes of the extreme shortness of the straight-line section of the curve are not known, but pressure conditions in this part of the reservoir were unusual in that the Arledge well near the productive edge of the reef and a pressure gradient existed in the reservoir from higher pressures near the edge of the reef to lower pressures near the center. Under these conditions, the area of drainage may have been eccentric in shape.

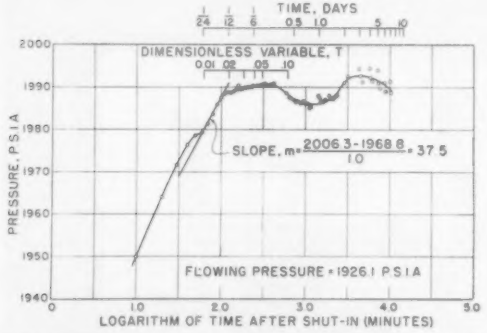
After the straight-line section of the buildup curve, the pressure remained relatively constant for 7 days at approximately 1,990 psia., except for fluctuations observed in the pressure. No positive indications of interference between the Arledge well and the offset wells were found. However, the absence of interference in a 7-day period does not warrant the conclusion that the reservoir is not interconnected within the area of the 2 Arledge "B" well.

No. 3 A. B. Eicke Well

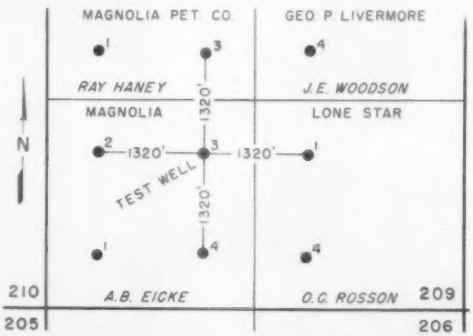
The uniform spacing of the offset wells to the 3 A. B. Eicke well is shown in Fig. 14. All of the direct offset wells were about 1,320 ft. from the test well. The offset wells were producing continuously at rates of approximately 80 bbl. of stock-tank oil per day. The Eicke well, completed with 4¾-in. open hole, produced at a daily rate of 102 bbl. of stock-tank oil immediately before the well was shut in. After testing was begun, it was learned that the flow rate of the well had been changed inadvertently 4 days before the well was shut in. Consequently, a good stabilization of the well probably was not obtained before the well was shut in.

The flowing pressure measured near the bottom of the Eicke well was 1,715 psia. and was considerably below the saturation pressure of the reservoir oil. However, the measured gas-oil ratio of 766 cu. ft. per bbl. of stock-tank oil was lower than the solution gas-oil ratio. These conditions indicate that a free-gas phase was accumulating in the reservoir around the well and probably influenced the permeability of the reservoir as computed from the pressure buildup curve shown in Fig. 15.

The subsurface pressure, after the well was shut in, increased rapidly and entered a short, straight-line section of the buildup


TIME, DAYS
1/24 1/12 1/6 0.5 1.0 5 10
DIMENSIONLESS VARIABLE, T
0.01 0.02 0.05 1.0
PRESSURE, P.S.I.A
SLOPE, m = 2006.3 - 1968.8 / 10 = 37.5
FLOWING PRESSURE = 1926.1 P.S.I.A
LOGARITHM OF TIME AFTER SHUT-IN (MINUTES)

WELL PRESSURES measured during pressure-buildup and well-interference tests of 2 G. H. Arledge "B" well. Fig. 13.



WELL LOCATIONS offsetting 3 A. B. Eicke well, Kelly-Snyder area. Fig. 14.

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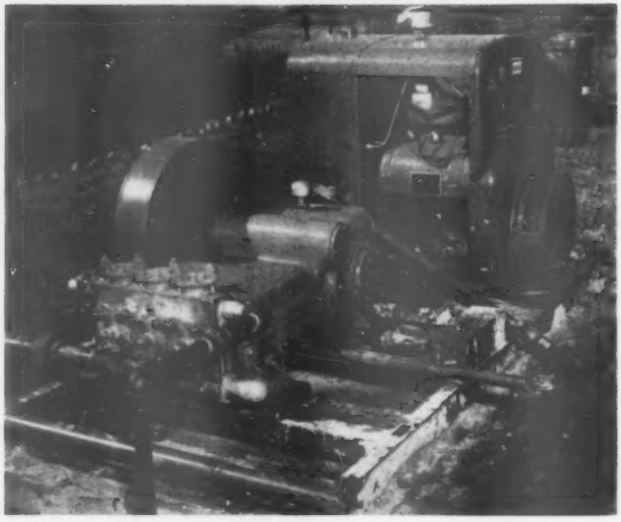

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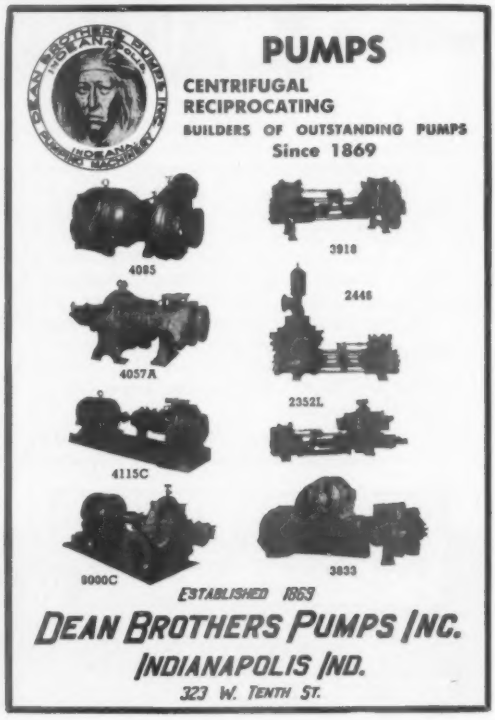

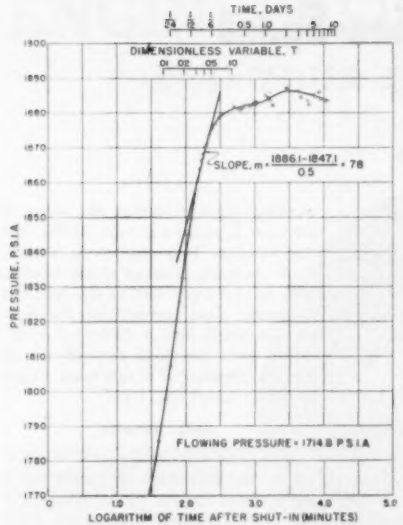
TIME, DAYS
DIMENSIONLESS VARIABLE, T
SLOPE, m = 1886 I - 1847 I / 0.5 = 78
PRESSURE, P.S.I.A
FLOWING PRESSURE = 1714.8 P.S.I.A
LOGARITHM OF TIME AFTER SHUT-IN (MINUTES)

SUBSURFACE PRESSURES measured during pressure-buildup and well-interference tests on 3 A. B. Eicke well. Fig. 15.

curve at T = 0.031 and ended the straight-line section at T = 0.047. With an effective productive thickness of 23 ft., the slope of 78 indicated a permeability of 6.5 md., which the authors believe was the effective permeability of the reservoir formation to oil in the presence of a free gas phase. The exact cause of the shortness of the straight-line section of the buildup curve is not known.

After the straight-line relationship between pressure and the logarithm of time, the observed pressures apparently reached a maximum about 53 hours after the well was shut in. The pressure then decreased somewhat, indicating interference between the 3 Eicke well and the offset wells. The presence of a free-gas phase in the reservoir would increase greatly the compressibility of the reservoir fluids, thereby materially extending the time required for the development of an observable pressure reaction to interference.

SUMMARY

Effective Permeability

Table 1 gives for each of the wells the slopes of the straight-line sections of the buildup curves, the production rates, the effective productive formation thickness, and characteristics of the reservoir oils necessary for calculating effective permeabilities by Equation 1. Slopes of the lines were taken from the figures showing pressures measured after shut in, plotted against the logarithm of times, in minutes, as explained in a previous section of this report. The characteristics of the reservoir oils were taken from analyses of bottom-hole samples supplied by the operators. Usually, the reservoir oil around the test well was assumed to be identical with that of the nearest well from which a bottom-hole sample had been taken and analyzed.

The effective oil-productive formation thickness for each well was taken as the perforation interval for the wells with this type of completion. For the 2 G. H. Arledge "B" and the 3 A. B. Eicke wells completed with open hole, the productive thickness was estimated from a MicroLog. However, it is emphasized that all of the wells tested in the Scurry reef were "partially penetrating," in that they were not drilled to the water table. Under these circumstances, the use of the thickness values given in Table 1 implies the assumption that the formation has no vertical permeability. For flow in isotropic formations where the well has a 50 per cent penetration of the oil-productive formation thickness, Muskat[9] concluded that the flow changes rapidly to radial type and can hardly be distinguished from a radial system at a distance from the well equal to twice the formation thickness. If the formation in the Scurry reef has an appreciable vertical permeability, the effective productive formation thickness should be greater than those used. Fortunately, the permeability capacity, in millidarcy-feet of the wells, can be calculated from Equation 1 without a thickness value, and the permeability capacity is probably as useful as permeability in engineering calculations.

Using the assumed formation thickness values given, the effective permeability was estimated and is given in the last column of Table 1. Effective permeability ranged from 4.6 to 36

(Continued on page 124)

TABLE 1—EFFECTIVE PERMEABILITY DATA FROM PRESSURE BUILDUP CURVES

Well—	m Slope of straight line	Q Prod. rate, bbl. per day	μ Viscosity (cp.)	F Formation volume factor ratio	kh Permeability capacity (md.-ft.)	h Net productive thickness (ft.)	k Effective permeability (md.)
No. 8 Wright Huddleston	61.1	142.9	0.35	1.573	209	*21	10.0
No. 3 P. J. Collins	39.7	162.7	0.44	1.563	458	*100	4.6
No. 1 A. E. Dennis	10.9	169.7	0.442	1.565	1,750	*48.5	36
No. 4 H. J. Schulze	18.0	186.8	0.445	1.567	1,176	*88	13.4
No. 6 R. W. Webb	25.1	337.2	0.40	1.56	1,360	*165	8.2
No. 2 G. H. Arledge "B"	37.5	141.0	0.34	1.61	334	†49	6.8
No. 3 A. B. Eicke	78	102.3	0.446	1.568	149	†23	‡6.5

*Perforation interval. †Net productive thickness estimated from MicroLog. ‡Effective permeability determined in the presence of a free-gas phase.

TABLE 2—DATA USED IN DEVELOPMENT OF T, DIMENSIONLESS VARIABLE PROPORTIONAL TO TIME, FOR STRAIGHT-LINE SECTIONS OF BUILDUP CURVES

Well—	t (hours) Time at start*	t (hours) Time at end*	f Total porosity fraction	c Mean liquid compressibility, psi.$^{-1}$	r Estimated radius of drainage (ft.)	T, dimensionless variable At start*	T, dimensionless variable At end*
No. 8 Wright Huddleston	1.18	5.52	0.078	15.0×10^{-6}	820	0.011	0.053
No. 3 P. J. Collins	1.96	5.15	0.053	13.7×10^{-6}	490	0.031	0.081
No. 1 A. E. Dennis	0.33	1.83	0.161	13.7×10^{-6}	570	0.010	0.055
No. 4 H. J. Schulze	2.08	5.65	0.129	13.7×10^{-6}	610	0.025	0.068
No. 6 R. W. Webb	2.38	8.73	0.08	13.7×10^{-6}	900	0.015	0.053
No. 2 G. H. Arledge "B"	1.00	1.67	0.055	18.0×10^{-6}	740	0.010	0.016
No. 3 A. B. Eicke	2.42	3.65	0.04	13.7×10^{-6}	740	0.031	0.047

*Of straight line.

TABLE 3—WELL-COMPLETION INFORMATION DEVELOPED FROM PRESSURE BUILDUP AND PRODUCTIVE INDEX TESTS ON WELLS IN SCURRY COUNTY, TEXAS

Well—	Perforations, total number	Acid treatment (gal.)	Productive index (bbl. per day per psi.)	Productive-index permeability (md.)	Effective permeability (md.)	Completion* efficiency ratio
No. 8 Wright Huddleston	†84	3,500	0.97	30	10.0	3.0
No. 3 P. J. Collins	344	2,500	1.8	14	4.6	3.0
No. 1 A. E. Dennis	291	1,000	3.5	57	36	1.6
No. 4 H. J. Schulze	528	1,000	5.0	44	13.4	3.3
No. 6 R. W. Webb	532	500	2.6	11	8.2	1.3
No. 2 G. H. Arledge "B"	Open hole	None	2.2	28	6.8	4.1
No. 3 A. B. Eicke	Open hole	None	0.60	21	6.5	3.1

*Productive-index permeability divided by effective permeability. †Jet shots.

Analysis and Design of Pipe-Line Spans

Application of stress analyses, based on the standard pressure piping code, is made to insure safe, economical design of spans across gullies and canyons.

by P. E. Reynolds*

THE Pacific Gas & Electric Co. utilizes open-span pipe crossings wherever possible along its 34-in. Topock-Milpitas gas main. In some areas of the desert, gullies exist which are susceptible to cloudburst rains and flash-flood runoffs. In other mountainous areas, creeks and canyons exist which are an inescapable problem of the right-of-way. In order to maintain a direct pipe-line route, many of these gullies and canyons could not be avoided.

Pipe-Line Design Code

Probably the most widely adopted code for the design of crosscountry gas-transmission mains has been the American Standard Code for Pressure Piping (A.S.A. B31.1-1951). Division 2 of Section 2 of the code applies particularly to crosscountry transmission mains which pass through sparsely populated or rural territories.

The code outlines the maximum allowable values of stress and gas working pressures for pipe which is manufactured to some specification other than those listed. Since the higher-strength pipes used for the present-day large-diameter mains fall into this category, any consideration of pipe-line-span design must determine the allowable value of maximum stresses which will limit the design.

In order to develop this application, specifications for the pipe which was installed on the Pacific Gas & Electric Co. 34-in. Topock-Milpitas gas main is used as an example. This pipe was purchased to a specification proposed by Consolidated Western Steel Corp. The pipe is an electric-fusion-welded product, fabricated from steel made by the open-hearth process, with certain limiting values of allowable chemical composition of the steel.

Pipe specifications . . . The specified transverse yield strength of the pipe was obtained by cold working the steel with internal pressure, expanding the steel to specified size. The resulting pipe had a minimum transverse elongation (in 2 in.) of 22 per cent and a minimum transverse yield strength and ultimate strength (according to the pipe-wall thickness) as follows:

	Min. strength (psi.)	
	Yield	Ult.
Wall thickness up to and including 3/8-in.	52,000	72,000
Wall thickness greater than 3/8 to 7/8-in.	48,000	65,000
Wall thickness greater than 7/8 to 1½-in.	46,000	65,000

The expanded steel pipe which was obtained was made from mill-rolled plates which had a yield strength of 40,000 psi. or more before undergoing the cold working expansion process. Since in the analysis of pipe-span stresses which is to follow, the longitudinal yield strength of the pipe also becomes an important factor, the assumption is made that the expansion process cold works the pipe only in the transverse direction, and that the longitudinal yield strength remains the same as that of the original unworked plate.

The one further physical test necessary on this pipe in order to establish the maximum allowable gas working pressure for the pipe line is the mill hydrostatic test. Section 2 of the A.S.A. code for pressure piping provides that the mill test pressure which can be specified is to be based upon the formula:

$$P_m = \frac{NKT}{D}$$

where:

P_m = mill test pressure, psig.
N = a numerical factor, which for the 34-in. pipe herein used as an example can be taken at the maximum allowable value of 1.80.
K = stipulated minimum effective yield strength, psig.
T = nominal or specified pipe-wall thickness, in.
D = nominal or specified outside diameter of pipe, in.

The calculation is equivalent to basing the maximum allowable mill test pressure on a stress that is equal to 90 per cent of the minimum specified transverse yield strength of the pipe.

With the pipe specified and obtained as above, then the A.S.A. code for pressure piping allows the pipe line to be operated at a maximum allowable working pressure within the scope of Division 2 at 80 per cent of the mill test pressure. This resolves to a maximum operating pressure which develops a stress of 72 per cent of the specified minimum yield strength of the pipe. Or converted into a factor of safety based upon the yield strength of the pipe, it resolves to a minimum design factor of safety of 1.39.

Span Stresses

If a pipe line is designed to operate at the maximum allowable working pressure for the buried sections of the pipe line, then any spans made of the same pipe as that used in the buried sections will have a lower factor of safety because of the added stresses resulting from the span. Hence, in order properly to design a pipe-line span, it becomes necessary to analyze the stresses which might be expected to occur in such a structure and then develop an allowable span structure with adequate factor of safety matching that of the rest of the pipe-line system.

Stresses which occur in a pipe-line span can be listed as follows:

1. Transverse tensile stress due to internal pressure.
2. Longitudinal tensile stress due to internal pressure.
3. Longitudinal compressive or tensile stress due to temperature change.
4. Longitudinal bending stresses (tensile and compressive) due to beam loading of the pipe in the span.

The first three stress conditions are common both to spans and buried pipe sections, however, to a different degree because of differing conditions that occur.

Internal Pressure

Transverse tensile stresses . . . The common method for calculating the transverse tensile stress due to internal pressure on pipe is the Barlow formula. Two accepted variations are recognized. The first is based upon the assumption that the maximum stress occurs at the outside diameter of the pipe (see American Standard Code for Pressure Piping, A.S.A. B31.1-1951). The second, where the shell thickness does not exceed 10 per cent of the radius, is based upon the assumption that the maximum stress occurs at

*Pacific Gas & Electric Co. Presented at meeting of Pacific Coast Gas Association, transmission conference, Berkeley, Calif., 1952.

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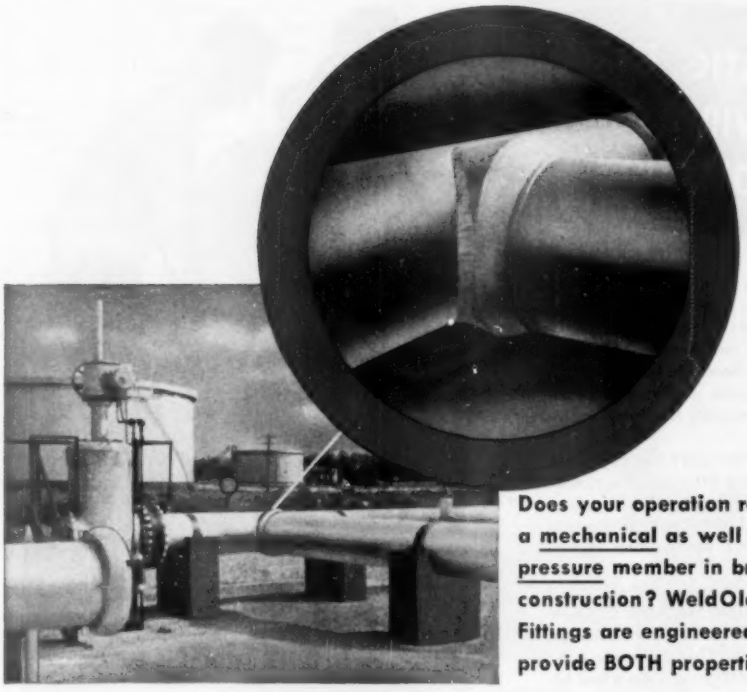

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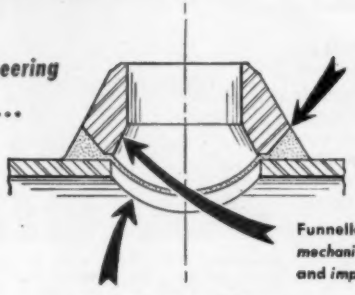

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IN 1926, a 6-mile, 8-inch gas pipe line was installed, extending from Atlantic City to Pleasantville, N. J. This line was laid about two feet underground, in land known locally as "the meadows." The terrain is tidal marsh and high tides flood the land with salt water. No steel pipe line, unless provided with *exceptional* protection, could possibly last long in this corrosive soil.

The owners knew this and therefore had their pipe line protected with Bitumastic Enamel. They were influenced, to a great extent, by the fact that this durable enamel had already proved its value by protecting ships and large-diameter steel water lines against corrosion.

In 1951, a pipe section was removed so that a tie-in could be made with another pipe line. After 25 years' exposure to tidal marsh and sea-water conditions, there wasn't a sign of corrosion. This shows the kind of protection Bitumastic Enamel gives, even when applied by the old-fashioned manual method pictured here.

Today, of course, gas and oil pipe lines are cleaned, primed, coated and wrapped mechanically. Further—improvements have been made in Bitumastic Enamels in the last 25 years. Give your next pipe-line project *lasting* protection against corrosion by specifying Bitumastic Enamels. Your Koppers representative will give you complete details and estimates.

Photograph made in 1926 shows gas pipe line (Atlantic City–Pleasantville) being coated with Bitumastic Enamel. A single coat of enamel was applied by the "Sling Method" to a minimum 1/16" thickness. In 1951, a pipe section was removed so that a tie-in with another line could be made. An examination revealed no sign of corrosion.

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the inside diameter (see A.P.I.-A.S.M.E. Code for Unfired Pressure Vessels—1934).

While the second method is possibly a more accurate calculation of the transverse stress, the first method is more severe and hence gives a more conservative comparison when studies are made of the calculated factor of safety. The A.S.A. procedure is used for determining the calculated transverse tensile stress in the pipe.

$$S_1 = PD/2t$$

where:
S_1 = transverse tensile stress due to internal pressure, psi.
P = internal gas pressure, psig.
D = outside diameter of pipe, in.
t = nominal wall thickness of pipe, in.

Longitudinal tensile stresses . . . The longitudinal tensile stress due to internal pressure is calculated as the longitudinal strain resulting from the transverse tensile stress due to the internal pressure. This is obtained by multiplying the transverse tensile stress by Poisson's ratio, which for steel is taken as 0.3. Such an analysis applies to the calculation of the longitudinal stress in an open end container, such as exists with the pipe-line spans, and differs from the longitudinal stress that occurs in a short-length closed-end container where the end thrust on the closed ends develops a longitudinal stress of one-half the transverse tensile stress.

$$S_2 = 0.30 \times S_1$$

Temperature stresses . . . The longitudinal stress resulting from temperature change is due to the restraint of expansion movement resulting from temperature change, and is calculated as:

$$S_3 = CE(t_2 - t_1) \text{ or, for steel,}$$

$$S_3 = 195\ (t_2 - t_1)$$

where:
S_3 = longitudinal stress due to temperature change, psi.
$(t_2 - t_1)$ = temperature change, °F.
C = coefficient of thermal expansion of steel (6.5×10^{-6}).
E = modulus of elasticity of steel (30×10^6).

Where the temperature change is an increase, then the longitudinal stress in the pipe section is compressive. Where the temperature change is a decrease, then the longitudinal pipe stress is tensile.

Beam stress . . . The longitudinal bending stresses due to beam loading are calculated assuming that the pipe section corresponds to a uniformly loaded beam. For either the unsupported or supported span conditions, the beam is similar to the fixed end condition for which the theoretical calculation for bending stresses (tensile and compressive) is derived as:

$$S_b = \pm \frac{1}{12} \frac{WL^2Y}{I}$$

where:
S_b = longitudinal stress due to beam loading, psi.
W = beam loading, psi.
L = span length, in.
Y = pipe radius, in.
I = moment of inertia of the transverse pipe section in (inches).[4]

For the application to analysis of pipe-line spans, this theoretical calculation has been modified to:

$$S_4 = \pm \frac{1}{10} \frac{WL^2Y}{I}$$

This modification is made to offset uncertainties in span construction. During construction of a span, positive attempts should be made to obtain firm bearing soil at the end points of a span. However, it is considered doubtful that the point of tangency of the pipe-line span will occur at the banks of the span crossing, but rather back into the banks some distance.

In order to be safe in this respect it is suggested that the length of the span be measured from the points of entrance of the pipe span into the

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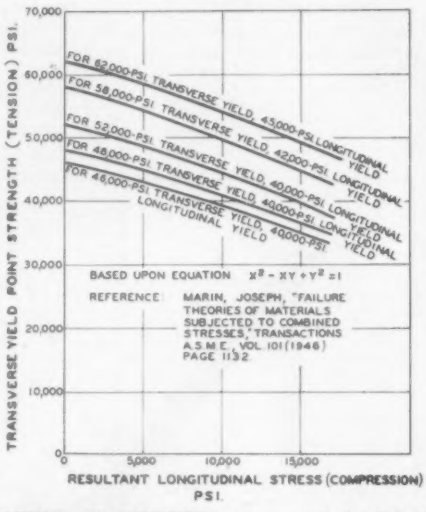
banks, irrespective of the exact location of firm bearing soil, and the modification be made in the factor of the stress formula to compensate for the more exact theoretical length of a fixed end span.

This modification is a compromise between the factor 1/12 in the fixed end beam formula and the factor ⅛ in the free end beam formula. It has the net effect of locating the firm bearing soil support points in the banks of ravines back a distance of about 8 per cent of the span length, or about 4 per cent at each end.

When determining the beam loading of the span, all factors contributing to this loading should be considered. These include the weight per foot of the pipe, the weight of the compressed gas, and the horizontal wind loading on the pipe. The vertical and horizontal loadings should be combined as the vector sum to obtain the resultant loading to be used to calculate the beam bending stresses.

The calculations for the separate components of the stress loading in a span, as briefed above, are simple and straightforward. However, the combining of these various stresses into a net resultant stress which determines the factor of safety of the design is more difficult analysis. As can be seen, certain of these stresses are transverse to the pipe, while other stresses are longitudinal to the pipe.


TRANSVERSE YIELD POINT STRENGTH (TENSION) PSI.
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
FOR 62,000-PSI TRANSVERSE YIELD, 45,000-PSI LONGITUDINAL YIELD
FOR 58,000-PSI TRANSVERSE YIELD, 42,000-PSI LONGITUDINAL YIELD
FOR 52,000-PSI TRANSVERSE YIELD, 40,000-PSI LONGITUDINAL YIELD
FOR 46,000-PSI TRANSVERSE YIELD, 40,000-PSI LONGITUDINAL YIELD
FOR 48,000-PSI TRANSVERSE YIELD, 40,000-PSI LONGITUDINAL YIELD
BASED UPON EQUATION $x^2 - xy + y^2 = 1$
REFERENCE: MARIN, JOSEPH, "FAILURE THEORIES OF MATERIALS SUBJECTED TO COMBINED STRESSES," TRANSACTIONS A.S.M.E., VOL. 101 (1946) PAGE 1132
0
5,000
10,000
15,000
RESULTANT LONGITUDINAL STRESS (COMPRESSION) PSI.

EFFECT OF COMBINED transverse and longitudinal STRESSES on yield-point strength of pipe. (Fig. 1).

In addition there is the combination of tensile and compressive stresses. Complicating this situation is the difference in yield strength of the pipe material in the transverse and longitudinal directions.

Test information[1] and studies[2] have shown that when a plate is stressed by tensions at right angles to each other, the allowable stresses in the two directions will be somewhat higher than if the plant were stressed in one direction only. Similarly, if a compression stress acts at right angles to a tension stress, the allowable value of the tension stress must be reduced because of the presence of the compressive stress.

As a result of studies of the phenomena, an equation has been developed[2] which mathematically describes the variation of the allowable tension stress under conditions of tension or compression stresses occurring at right angles to the primary stress. This equation is:

$$x^2 - xy + y^2 = 1$$

where the y coordinate is the primary stress (in our application the transverse yield strength of the pipe) and the x coordinate is the right angle stress (in our application the longitudinal stress in the pipe).

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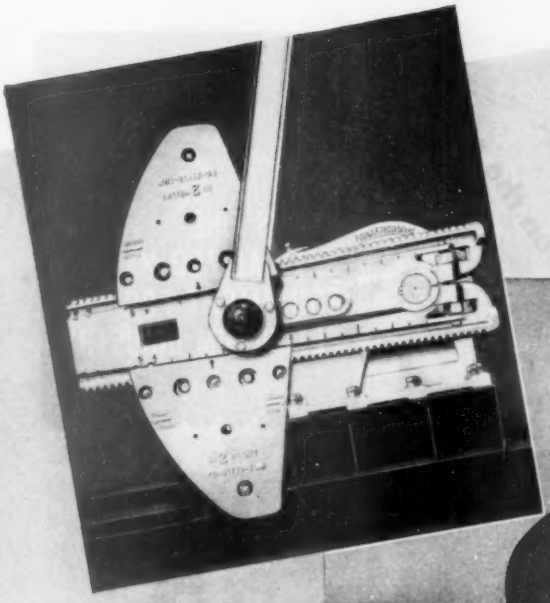

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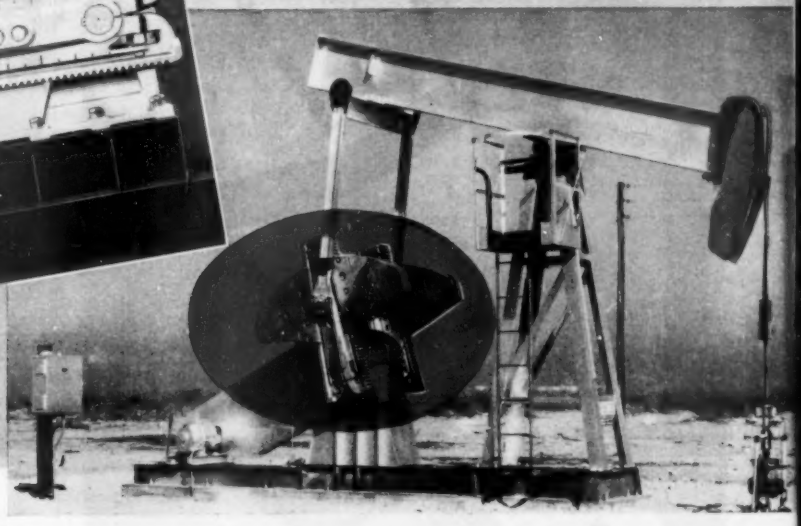

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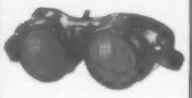

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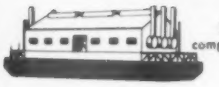

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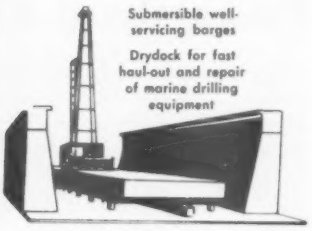

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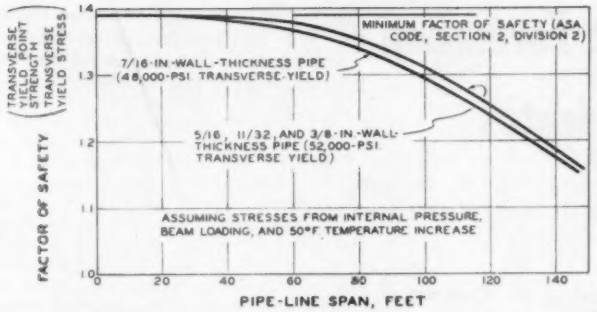
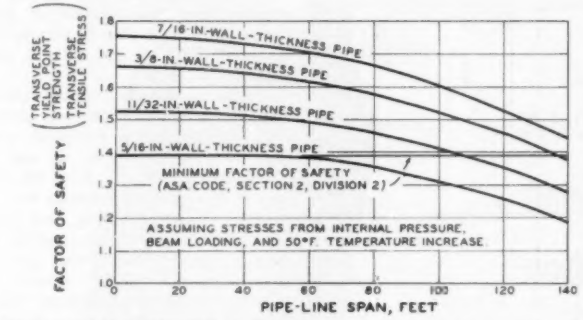
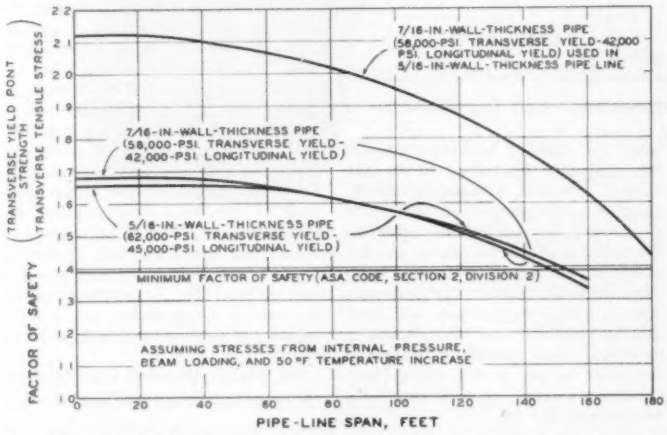

FACTOR OF SAFETY
(TRANSVERSE YIELD POINT STRENGTH ÷ TRANSVERSE YIELD STRESS)
MINIMUM FACTOR OF SAFETY (ASA CODE, SECTION 2, DIVISION 2)
7/16-IN.-WALL-THICKNESS PIPE (48,000-PSI. TRANSVERSE YIELD)
5/16-, 11/32-, AND 3/8-IN.-WALL-THICKNESS PIPE (52,000-PSI. TRANSVERSE YIELD)
ASSUMING STRESSES FROM INTERNAL PRESSURE, BEAM LOADING, AND 50°F. TEMPERATURE INCREASE
PIPE-LINE SPAN, FEET

FACTOR OF SAFETY as function of span length for 34-in. o.d. high-strength steel pipe. (Fig. 2).


FACTOR OF SAFETY
(TRANSVERSE YIELD POINT STRENGTH ÷ TRANSVERSE TENSILE STRESS)
7/16-IN.-WALL-THICKNESS PIPE
3/8-IN.-WALL-THICKNESS PIPE
11/32-IN.-WALL-THICKNESS PIPE
5/16-IN.-WALL-THICKNESS PIPE
MINIMUM FACTOR OF SAFETY (ASA CODE, SECTION 2, DIVISION 2)
ASSUMING STRESSES FROM INTERNAL PRESSURE, BEAM LOADING, AND 50°F. TEMPERATURE INCREASE
PIPE-LINE SPAN, FEET

EFFECT OF WALL THICKNESS of pipe on factor of safety for various span lengths of 34-in. o.d. high-strength steel pipe. (Fig. 3).


FACTOR OF SAFETY
(TRANSVERSE YIELD PONT STRENGTH ÷ TRANSVERSE TENSILE STRESS)
7/16-IN.-WALL-THICKNESS PIPE (58,000-PSI. TRANSVERSE YIELD-42,000 PSI. LONGITUDINAL YIELD) USED IN 5/16-IN.-WALL-THICKNESS PIPE LINE
7/16-IN.-WALL-THICKNESS PIPE (58,000-PSI. TRANSVERSE YIELD-42,000-PSI. LONGITUDINAL YIELD)
5/16-IN.-WALL-THICKNESS PIPE (62,000-PSI. TRANSVERSE YIELD-45,000-PSI. LONGITUDINAL YIELD)
MINIMUM FACTOR OF SAFETY (ASA CODE, SECTION 2, DIVISION 2)
ASSUMING STRESSES FROM INTERNAL PRESSURE, BEAM LOADING, AND 50°F. TEMPERATURE INCREASE
PIPE-LINE SPAN, FEET

FACTOR OF SAFETY for various span lengths, using selected high physical test pipe for 34-in. o.d. steel pipe. (Fig. 4).

Fig. 1 shows this equation plotted for the particular yield strength constants which apply to the expanded steel pipe supplied for the Topock-Milpitas gas main.

Offsetting stresses . . . When combining the various stresses that are calculated as occurring in the pipe-line spans, certain stresses are found to be offsetting. The longitudinal tensile stress due to pressure in the pipe happens to be equal approximately to the longitudinal compression stress resulting from a 50° F. temperature rise. At this condition this cancellation effectively eliminates all the longitudinal stresses except for those resulting from the beam bending stress.

For conditions where the temperature change is a decrease, the resultant longitudinal stress is tensile. The combined longitudinal tensile stresses then tend to offset the compressive longitudinal stress resulting from the beam loading, and a lesser reduction in the transverse factor of safety of the pipe will occur.

Fig. 2 shows a plot of the factor of safety versus span length for the 34-in. o.d. pipe of various wall thicknesses which was purchased for the Topock-Milpitas gas main. This plot is based upon gas working pressures which develop a transverse tensile stress of 72 per cent of the yield strength of the pipe (maximum allowable according to Division 2, Section 2, A.S.A. Code for Pressure Piping) and upon an assumed maximum temperature increase at the span of 50° F.

The effect of the increasing magnitude of the compressive longitudinal stress resulting from increased length of span can be seen in the plotted decrease in factor of safety as the span length increases. It is obvious from this chart that only comparatively short spans can be allowed in a pipe line of this design without introducing weak points which seriously lower the factor of safety of the pipe line.

Design Application of the Stress Analysis

Studies can now be made of various alternate span designs which might be suggested to increase the length of allowable spans. One such proposal might be the use of heavier wall-thickness pipe in the span sections. Fig. 3 shows the results of such a study. This chart again uses the 34-in. o.d. pipe and in this case applies to the use of increased wall-thickness pipe in spans which would occur in a basic ⅞-in. wall-thickness section of the pipe line.

A similar assumption to that of Fig. 2 was made for the temperature increase of 50° F. at the span. With thicker wall pipe used in this manner at the spans, the analysis shows that for a particular span length the net compressive stress obtained after combining the calculated longitudinal stresses due to internal pressure, temperature and beam loading is greater than when the pipe is operating at higher pressures. As a result the transverse yield point strength of the pipe in the span is less.

However, since it is a heavier wall section of pipe, the actual transverse tensile stress due to internal pressure is less in proportion, so that an increase in factor of safety results.

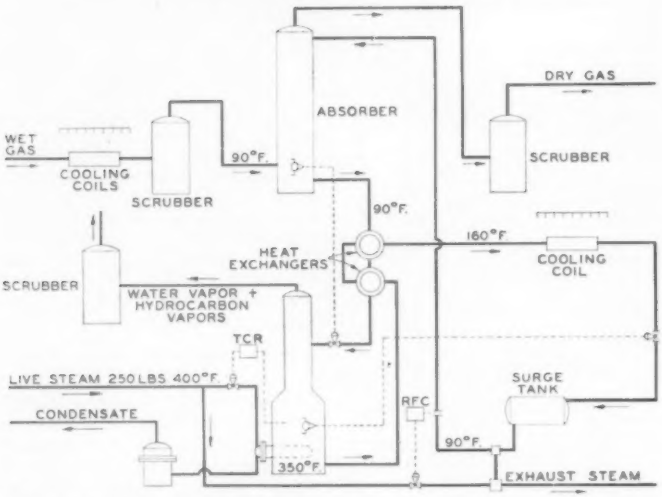
The same beneficial results can be shown for any portion of the pipe line, no matter what the basic wall thickness

(Continued on page 134)

How to Prevent Formation Of Gas Hydrates

Part 2 of a paper on gas treating. Part 1, on gas desulfurization, was presented in Journal issue of August 11.

by Leroy Culbertson* and J. S. Connors*



GLYCOL DEHYDRATOR employs stripping and absorption cycle for water removal (Fig. 1).

SINCE the early 1930's the need to dehydrate gas to prevent formation of gas hydrates has become more acute. This has been the result of increased operating pressures for gas transmission lines and increased interest in pressure maintenance for producing fields to promote more efficient oil recovery.

The fact that gaseous substances may form hydrates under conditions which are proper for the combination of gas with water has been known since 1810. Today, thanks to the efforts of E. G. Hammerschmidt, W. M. Deaton, D. L. Katz, D. B. Carson, and many others, the temperature at which gases of varying compositions will form hydrates for any given pressure may be predicted. Similarly the water content of natural gas at varying temperatures and pressures is known.

In the early days of hydrate problems, the rate of hydrate formation was controlled by adding to the gas, alcohol, ammonia, ketones, or calcium chloride. This method is still fairly satisfactory in cases where conditions favorable to the formation of gas hydrates do not occur frequently. However, since the temperature and pressure at which gas hydrates will form can be predicted, the best remedy is to reduce water content of the gas to the point where, at the coldest temperature expected, no free water will be available for hydrate formation. This method of hydrate control has an added advantage in that transmission lines will be free of internal corrosion and there will be no accumulation of corrosion products to cause increased pressure drop and loss of line capacity.

*Phillips Petroleum Co. Second section of paper presented at Fourth Oil-Recovery Conference, Texas Petroleum Research Committee, Texas A. & M. College, College Station, Tex.

Absorption and Adsorption Processes

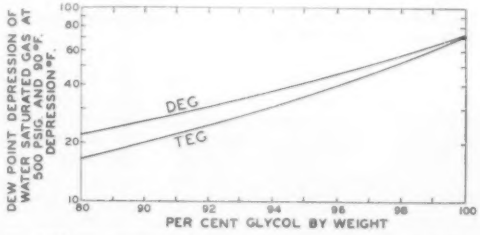
The two predominant dehydration processes in use today are the absorption type and the adsorption type. In the absorption process the absorbing medium is usually diethylene or triethylene glycol. In the adsorption process the adsorbing medium is a dry desiccant which may be bauxite, silica gel, activated alumina, or a special siliceous material such as Sovabead.

The glycol absorption process involves the same stripping and adsorption cycle as is employed in the aqueous amine process described previously. A flow sketch is shown in Fig. 1. However, since this process is truly one of adsorption, the quantity of glycol circulated will be directly proportional to the quantity of gas for any given pressure.

Assuming adequate glycol circulation, the dew-point depression obtained will depend on the particular glycol selected and the purity of the still kettle product. Fig. 2 shows the theoretical dew-point depressions which may be obtained by using each of the two common glycols in varying degrees of purity. This chart was calculated on the basis of Raoult's law without regard for deviations. Actually it is possible to obtain dew-point depressions approximately 10 per cent greater than shown.

While the graphs indicate the diethylene glycol is the superior absorbing medium on a weight percentage basis, it is possible to obtain a greater dew-point depression with triethylene glycol since due to its higher boiling point and higher temperature of decomposition a higher degree of purity can be secured as a still-kettle product. For a 500-psig. absorption system operating at 90° F. a dew point of approximately 40° F. can be reached in commercial operation with diethylene glycol while with triethylene glycol a dew point of 30° F. can be obtained. As contact temperatures are lowered so are the dew points but in a lesser degree.

As contact pressures are increased the maximum dew-point depression ob-



DEW-POINT DEPRESSION of gas by glycol-water solutions (Fig. 2).

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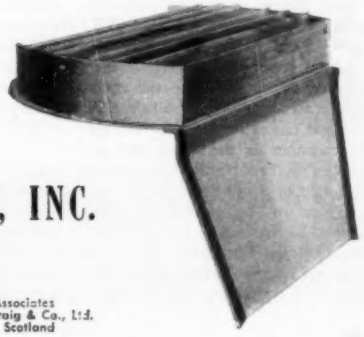

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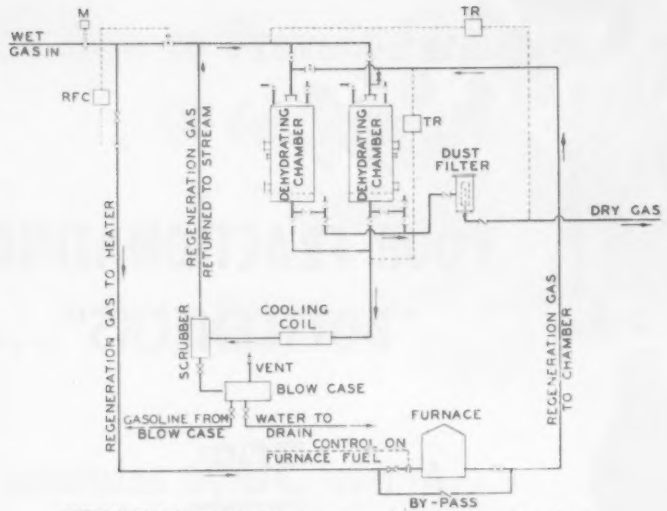

SOLID-DESICCANT dehydrator removes moisture by adsorption (Fig. 3).

tainable decreases so that at approximately 1,200 psig. the dew-point depression reached will be only approximately 75 per cent of that for 500 psig. Therefore glycol dehydrators are limited in their capability to prevent hydrate formation when the gas to be dehydrated is at high pressures and subjected to the winter temperatures prevailing in cold climates.

Glycol dehydrators have a great advantage over the adsorption-process dehydrators in the cost of installation.

The adsorption-process dehydrators employ solid-type desiccants and are capable of reducing the dew point of a gas to a point well below 0° F. Since two or more chambers are employed, the process may be called continuous batch. One of the chambers is used for dry gas while the other, a spent chamber, is being regenerated. Operations are regulated so that when the desiccant in one chamber is approaching the limit of its capacity to absorb water, the other is completely regenerated and the chamber services are switched on a time cycle.

A flow sketch of a solid-desiccant dehydrator is shown in Fig. 3. In this unit gas cooled to approximately 90° F. is passed downward through a bed, or beds, of desiccant where the moisture content is removed by adsorption. The dry gas emerging from the bottom of the chamber is then sent through dust filters before being delivered to the pipe line or other uses.

A portion of the gas to be dehydrated (10-20 per cent of the total) is diverted from the main stream of gas and sent to a heater where the temperature is raised to approximately 375° F. Hot gas emerging from the heater is passed downward through a chamber containing desiccant which has been previously saturated with water adsorbed from wet gas.

As the bed is heated by direct contact with the hot gas, the equilibrium is reversed and the bed gives up its water content. This heating process is continued until the temperature of the outlet gas reaches 325°-350° F. At this time the regeneration gas stream is allowed to bypass the heater and the hot desiccant is cooled by direct contact with additional gas. This cooling is continued until the outlet gas is within approximately 20° F. of the inlet gas. At this time the chamber is considered to be completely regenerated and ready for use.

The hot regeneration gas saturated with water is cooled in water coolers to a temperature of 90° F. and the excess water removed in the water scrubber. Gas leaving the water scrubber is returned to the gas stream being dehydrated.

In this process the gas is thoroughly dehydrated. The chief disadvantages of the process are the high cost of installation and the pressure drop required which can amount to a considerable requirement in compressor horsepower.

Desiccant Poisoning

Life of the materials used as desiccants is subject to extreme variations. Some desiccants are easily poisoned by contamination with oil, others by sulfur, and all show a decided drop in capacity during their early life. However, in most cases a desiccant life of 4 to 5 years may be assumed using a capacity for water adsorption of 5 per cent by weight.

Economic Comparison

For purposes of economic comparison, two cases in which 100 million standard cubic feet of gas at 500 psig. is to be dehydrated are considered here. In one case, the glycol process is used and in the other, the dry-desiccant process is used. These results are summarized in Table 1.

TABLE 1—COST OF DEHYDRATING NATURAL GAS FOR PIPE-LINE SALE
(100 million cubic feet capacity)

	Pipe-line dehydrator	
	Glycol	Dry desiccant
Investment	$445,000	$710,000
Operating costs:		
Operating and repair labor	$21,800	$21,800
Maintenance material and supplies	10,110	10,110
Purchased water, electricity and fuel	4,500	11,570
Chemicals	8,750	2,100
Total direct operating cost, $/year	$45,160	$45,550
Total direct operating cost, cents/M.c.f.	0.124	0.125
Indirect overhead, ad valorem taxes and insurance	14,600	14,600
Depreciation and interest	108,750	180,000
Total operating cost, $/year	$168,510	$240,180
Total operating cost, cents/M.c.f.	0.462	0.658

Since dehydration plants can ordinarily be shut down for short periods for maintenance purposes and the gas bypassed to prevent interruptions in gas delivery, very little standby equipment was included in the investment cost. However, as in the case of the desulfurizer (see The Oil and Gas Journal, , page), the cost of steam generating facilities, camp, plant site and buildings is included. In addition, the cost of the gas-cooling equipment is included.

This cost comparison is not truly indicative of the two methods since the solid-desiccant unit can process 125 million standard cubic feet if a higher pressure drop can be tolerated, while the maximum capacity of the glycol unit is 100 million standard cubic feet.

It is hoped that this discussion will contribute to the conservation of our natural resources by showing how desulfurization and dehydration of natural gas are being accomplished.

Reference

1. E. G. Hammerschmidt, Calculations and Determinations of the Moisture Content of Compressed Natural Gas, Western Gas, December 1933.

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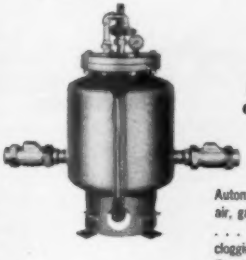

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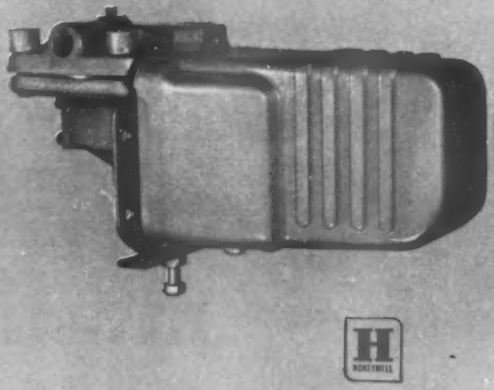

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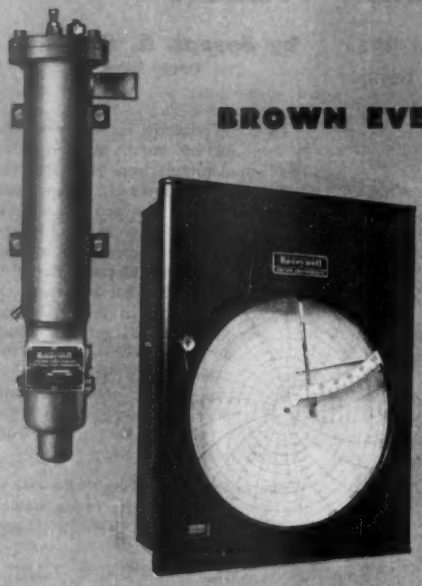

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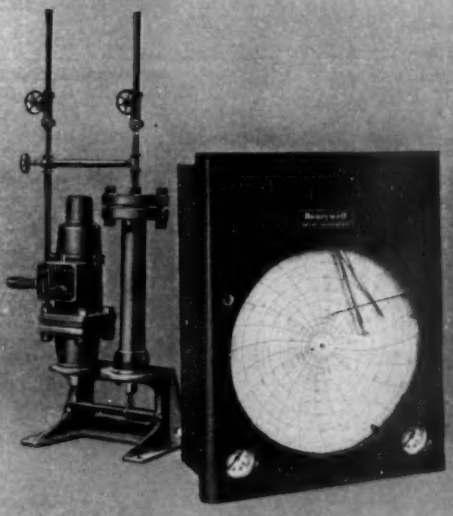

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Telescoping Casing Program Saves 5,750 Ft. Of Pipe on South Texas Wildcat

Series of telescoping casing strings ranged from 20-in. down to 5-in. liner, each string set on oil-tool hanger

by Joseph A. Kornfeld
District Editor

A SAVING of 5,750 ft. in casing has been effected in a deep South Texas wildcat. Each string of pipe was set on an oil-tool hanger and cemented in the base of the larger string. This practice is a departure from the conventional method of setting all strings in the cellar except the liner.

Thus 14,159-ft. hole was cased to within 17 ft. of bottom by running the series of telescoping casing strings which ranged from 20-in. at the surface to 5-in. liner at the bottom.

Was Farthest South in U. S.

The well was drilled 2,500 ft. from the Rio Grande River near Brownsville in Cameron County, Texas, and 7 miles from the Gulf of Mexico. It was the southernmost drilling operation in the United States. The block was drilled on a farmout from Pure Oil Co.

Geologically this location is in the heart of the Rio Grande embayment, a salt dome province of South Texas. The area had been surveyed by reflection seismograph crews.

Joint Operation

The deep-drilling job was a joint operation by C. G. Glasscock and Pontiac Refining Corp., both of Corpus Christi, with A. C. Sorrelle of Houston. At a depth of 11,485 ft. Gulf Oil Corp. lent financial assistance in deepening the well to its final abandonment depth of 14,159 ft. The well name is 1 M. Esperson Estate, on a 6,300-acre lease in Share 1, Potrero de San Martin (Jose Ygnacio de Trevino) grant.

John Holmes, Houston, was drilling contractor, with John Willis as tool pusher.

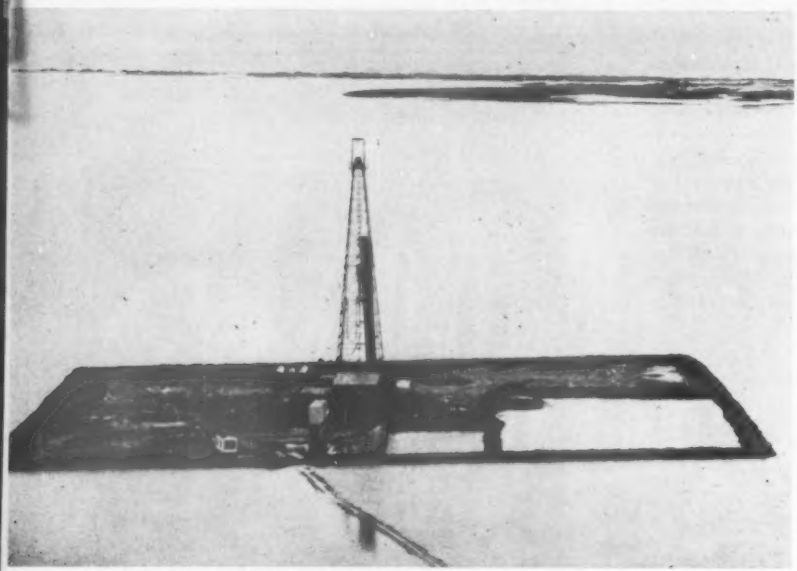
Rig Description

A 136-ft. 800,000-lb.-capacity steel derrick was employed using a 10-ft. substructure. The crown and traveling block were 300-ton capacity, as was the hook.

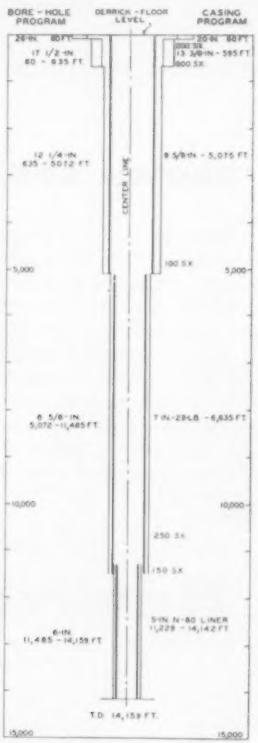
The "96" drilling rig was powered by three 325-hp. butane engines. Two 18-in. mud pumps were run from the draw works. One 16-in. pump, individually-powered, was used to mix mud.

Due to the swampy character of the river bottoms, it was necessary to construct about 2 miles of road. Some of the road was graded but a tremendous footage of boards was used. Due to the ever-imminent danger of floodwaters from the Rio Grande River, the contractor built a 6-ft. dike completely surrounding the rig and mud pits. Transportation to the rig was by boat from the highway extending from Brownsville to Boca Chica.

Water to drill . . . Prior to the rise in the Rio Grande River, crews hauled drilling water to the drill site. Later



A 6-FT. DIKE completely surrounded the rig and mud pits. It held while flood waters swirled around the wildcat during deepening operations.



BOREHOLE, casing, and cementing programs of C. G. Glasscock et al 1 M. Esperson Estate exploratory test, Cameron County, Texas.

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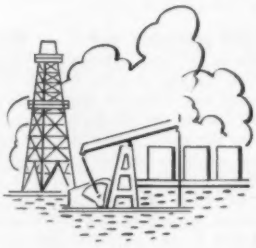

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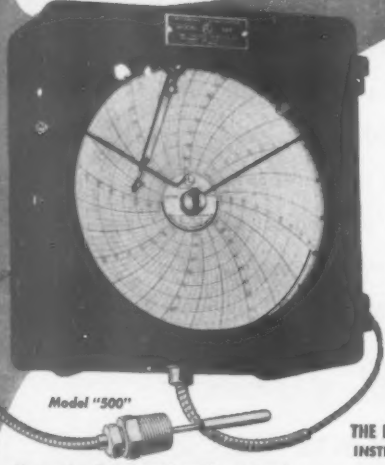

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during a slight rise in the river, high-volume pumps were installed and water was stored in a lake situated 2 miles from the rig.

Hole Sizes

The contractor cut 60 ft. of 26-in. hole for the conductor pipe; 3 joints of 20-in. conductor were set and cemented with 200 sacks of regular cement.

A 17½-in. bit was run and surface hole made to 635 ft. Surface casing was 13⅜-in. set from 60 to 535 ft.; 600 sacks of regular cement were placed behind the pipe.

First protection pipe . . . At a depth of 635 ft. the hole was reduced to 12¼ in. This size hole was cut to a depth of 5,072 ft. At that depth, 5,075 ft. of 9⅝-in. pipe was set and cemented with 100 sacks of regular cement.

Second protection pipe . . . At 5,072 ft. the hole was reduced to 8⅝-in.; this size bit was used to a depth of 11,485 ft.

At this depth the well was temporarily abandoned for about 60 days.

Crews then reset up on the well and washed to bottom. When the hole was in condition ready to run 7-in. liner, a rise in the Rio Grande River caused flooding of the entire area and threatened the protecting dike. Water stood more than 4 ft. deep around the location, and floated all over the roadway.

Rig operations were shut down and a labor gang employed to repair the dike. The dike was saved by placing roofing paper on the outside of the dike and weighting it down below the water line to take the wave action. After the flood receded, the crews started back in the hole to recondition the hole. Drill pipe was stuck at about 11,000 ft.

The crew backed off at 5,200 ft., made two washovers, and worked all pipe loose. A total of 72 hours was spent fishing on the job but there was no loss of drill pipe.

Third protection pipe . . . Hole was cleaned out and 7-in. o.d. X line 29-lb. N-80 casing run to 11,485 ft.; this string was hung on oil-tool hanger at 5,075 ft. in the 9⅝-in casing.

At this point, a 6-in. bit was run and hole made to 14,159 ft. A 5-in. N-80 18-lb. X line liner was run from 11,229 to 14,142 ft. The liner was hung on an oil-tool packer in the 7-in. casing at 11,299 ft. and extended 256 ft. up in the 7-in. string.

After a series of several unproductive tests below 13,000 ft., the well was abandoned at total depth of 14,159 ft.

Water flows . . . A water flow was encountered at about 8,700 ft. At that

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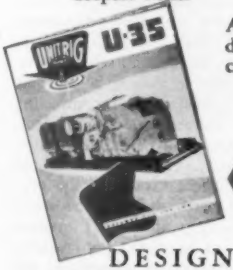

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SEE PAGE 145

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depth, crews increased mud weight to 16-lb.; mud weights of from 15 to 16 lb. per gallon were maintained to completion.

Drilling Bits

Rock bits used in this well were as follows:
Conductor: 1 26-in. drag bit.
Surface Pipe: 1 17½-in. three-way drag bit.
First Protection: 5 12¼-in. rock bits.
Second Protection: 31 8⅜-in. rock bits.
Liner: 22 6-in. rock bits; 4 4⅛-in. rock bits.

Acknowledgment

The author expresses thanks to James C. Storm, Corpus Christi, Tex., drilling superintendent, C. G. Glasscock, for data used in this article, and to John Holmes, Houston, the drilling contractor on this particular well.

Well-Interference and Pressure-Buildup Tests

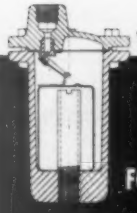
(Continued from page 105)

md. One well, the 3 A. B. Eicke, had a permeability of 6.5 md., which the authors believe to be an effective permeability determined with a free-gas phase in the reservoir.

The data necessary for computing values of T, the dimensionless variable proportional to time, for the straight-line sections of the buildup curves, are given in Table 2. Porosity was estimated from electric logs or core analyses and the radius of drainage was determined as previously explained. All of the lines met the requirements of Miller, Dyes, and Hutchinson[3] in that they came within the T limits of 0.01 and 0.1. However, two of the lines (for the Arledge and Eicke wells) were relatively short, and the causes of this are not known.

Well-completion methods, acid treatments, productive indexes, and permeability calculated from productive indexes are summarized in Table 3. The permeability determined by Equation 1 from the slope of the buildup curve represents the effective permeability of drainage area away from the immediate vicinity of the well, and the permeability determined by the productive index represents the effective permeability of the whole drainage area, including well-completion effects. Assuming that the formation is isotropic and that the drilling and completing of the well neither helped nor damaged the permeability of the formation, the two permeabilities should be identical. Then, a ratio of the productive-index permeability to the effective permeability greater than 1.0 means that an area of improved permeability exists in the immediate vicinity of the well.

Obviously, isotropic formations do not exist in practice, therefore conclusions regarding the efficiency of well completions by this method are



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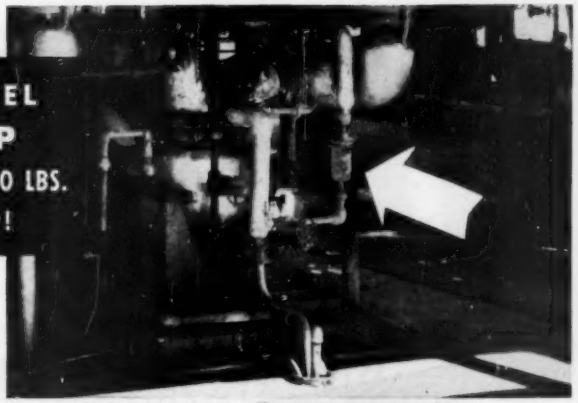

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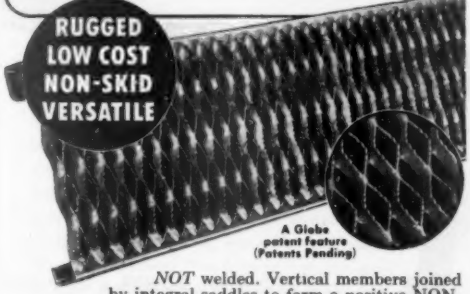

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LOOK FOR THE GREEN RODS

only in the nature of probabilities. The last column of Table 3 gives the ratio of permeabilities to well-completion efficiencies. All wells tested had a completion ratio greater than 1.0, indicating that the well-completion methods were adequate.

Acknowledgments

Determination of the buildup characteristics and the suitability for gas or water injection of wells producing from the Scurry reef was part of a joint study by the Bureau of Mines and the geological survey of the reef fields of Scurry County, Texas, undertaken at the request of the Petroleum Administration for Defense.

Special acknowledgment is due the management of Humble Oil & Refining Co., Lone Star Producing Co., Magnolia Petroleum Co., Sun Oil Co., and Sunray Oil Corp., for granting permission to conduct the tests and to their respective field personnel for making arrangements for the tests. The Railroad Commission of Texas gave permission for oil-production rates above the daily allowable rate while the tests were in progress.

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Acknowledgment

An acknowledgment to Big Chief Drilling Co., Oklahoma City, for its valuable assistance in drill-collar research was inadvertently omitted from the article by W. M. Booth, on "Oversize Drill Collars Aid Drilling in Crooked-Hole Country" which appeared in the August 4, 1952, issue of The Oil and Gas Journal.

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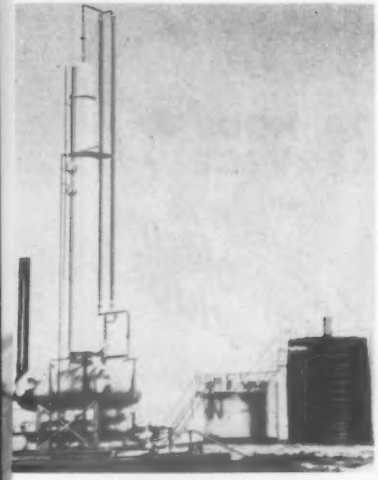
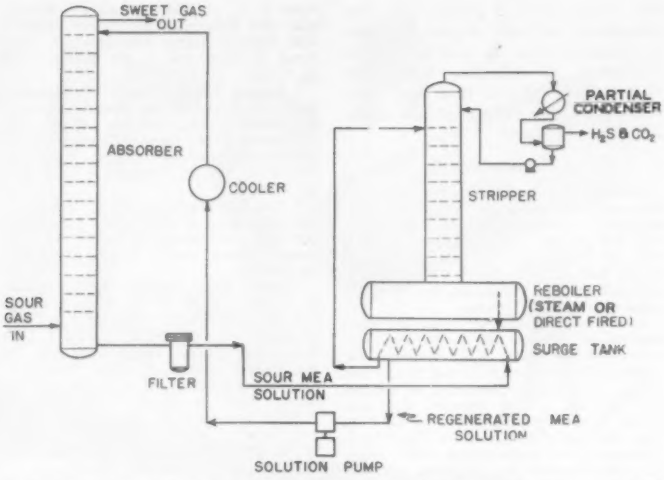


Well-head desulfurizers may be installed at remote points since they require little attention.



Flow arrangement of field processing operation for desulfurizing natural gas at well head. Commercial units are compact, self-contained, and simple in operation.

ROOTING OUT CORROSION AT ITS SOURCE

Skid-Mounted Desulfurizer for Well-Head Installation

by R. B. Tuttle
Associate Editor

A SURE way to reduce costly corrosion of sour-gas gathering systems is to eliminate the cause at the well head. This can be accomplished economically in most cases with packaged-type, skid-mounted equipment.

Application of the skid-mounted, field-processing-plant idea to hydrogen sulfide extraction is comparatively recent and promises to be the solution to problems other than gathering-system corrosion. As for example, where sour-gas wells are intermingled in the same field with sweet-gas wells, a skid-mounted desulfurizer may be set up to treat the sour gas at the well. The operation thus renders the gas suitable for intermixing with sweet gas. Montana's Elk Basin field is typical of an area where well-head extraction of H_2S has proved to be a profitable operation where both sweet and sour gas are produced.

Field of application . . . Operationwise, the skid-mounted desulfurization unit is analogous to crude-oil field-treating processes, dehydrators, and midget natural-gasoline plants. However, input capacities on the skid-mounted desulfurizers are somewhat larger than the midget-type natural-gasoline plant. Nominal input rating on such H_2S extraction installations range from 100,000 standard cubic feet daily for the smaller plants to 30,000,000 standard cubic feet daily for the larger ones.

Efficiencies of the skid-mounted desulfurizers are comparable with large-capacity, centrally located H_2S extraction plants. These well-head units can reduce H_2S and CO_2 content of the gas to less than 0.25 grains per 100 standard cubic feet.

Need for operator attention has been reduced to a minimum for these plants. Control instruments used are of a type familiar to oil-field personnel and the general process flow scheme is very similar to that of the conventional field glycol dehydration units.

Flow description . . . Design of the desulfurizer is such that equipment corrosion is minimized. Flow scheme of a typical skid-mounted MEA plant is shown in the accompanying diagram. The filter in the outlet line from the absorber contributes appreciably to corrosion reduction. This filter is utilized to remove any sludge, particularly iron sulfide, which may be present in the sour MEA solution. Removal of sludge

REPRESENTATIVE DATA FROM MEA DESULFURIZER OPERATIONS

Flow rate, M.M.c.f.d.		Gas temperature	Gas pressure	Total sourness, grains per 100 s.c.f.	
Design	Actual	(°F.)	(psig.)	Design	Actual
0.25	0.19	98	347	1.0	0.87
10.5	9.3	103	845	1.0	0.91
10.0	9.5	89	760	1.0	0.96
20.0	14.9	85	460	0.25	0.20
3.0	1.9	92	510	0.25	0.19
5.0	3.6	90	620	0.25	0.23
5.0	4.3	87	410	1.0	0.94

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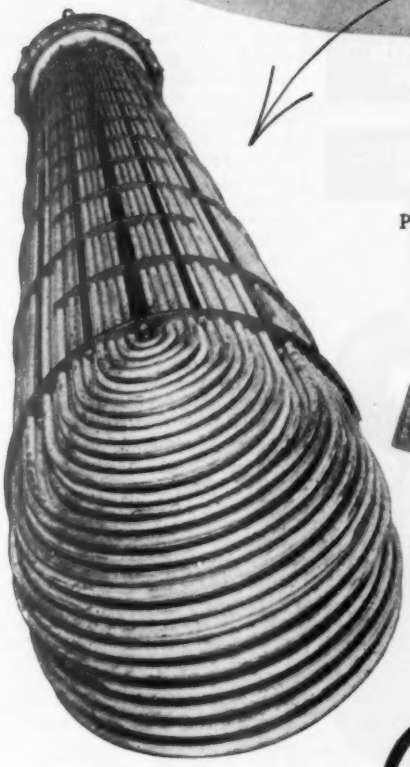

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"This condition . . . the secret to reduced corrosion."

lowers the chances of corrosion-erosion to the stripper reboiler, thus minimizing tube burnout. Filtering of the sour MEA stream also reduces fouling in the stripper and in other parts of the system.

Over all, the plant flow scheme is simple, yet all necessary steps and attendant equipment for the usual MEA desulfurizer are incorporated. The absorber and stripper columns, which are larger than those for a dehydration plant of comparable capacity, are normally the usual plate type for diameters above 20 in. For smaller-diameter towers, packing instead of plates may be used.

The only utility required for operating the skid-mounted desulfurizer is natural gas. However, plants may be set up for operation with electrical or steam power, cooling water, and natural gas fuel or steam for reboiler heating. For plant operation in general, gas for engine fuel, reboiler service, and for powering reciprocating and other pumps is taken from the treated-gas stream. The gas engines used with installations of this type supply power for operating the fans on aerial-type coolers.

Heat from the regenerated MEA solution is transferred to the sour MEA solution stream via an exchanger which also serves as a surge drum for the solution charge pump. Further cooling of the regenerated MEA solution stream depends on solution flow rate and utilities available. Final heating of the sour solution stream is carried out with a reboiler installed directly below the stripper and above the surge tank.

Stripping of H_2S and CO_2 from the foul amine occurs in the lower portion of the stripping column and is accomplished by vaporization and reaction. A partial condenser on the stripper overhead stream is utilized to reduce vaporization losses of water and amine. This condenser supplies reflux for the top of the stripper. Vapors from a reflux accumulator may be run to a sulfur-conversion plant or to flare as desired.

Operating conditions . . . Both type of pump and type of cooling depend on available utilities. Where possible the regenerated amine stream is fed to the absorber at 100° F. or lower. Operation of the stripper is usually carried out at around 7 psi. back pressure with reboiler temperature at 225° F. No serious corrosion problems have been encountered at this temperature as contrasted with temperatures in the range of 240°-290° F. This relatively low

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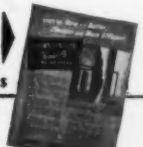

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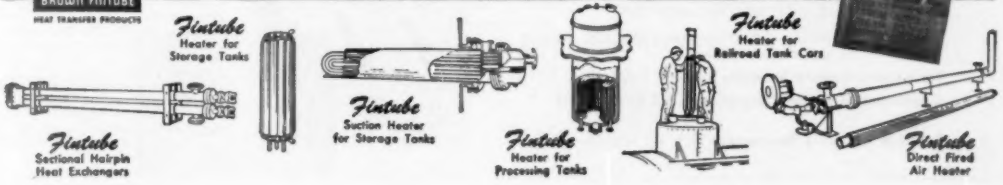
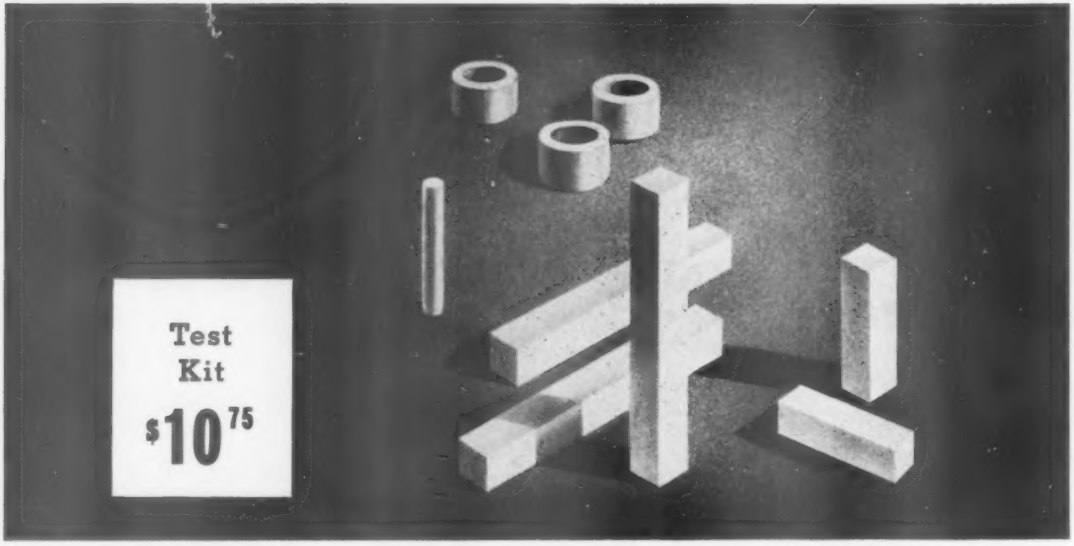


Now, TEST NEW CARBOLOY *for corrosion,*



FOR METALLURGISTS! ENGINEERS! PRODUCT DESIGNERS! Lab-test kit of new Grade 608 Carboloy Chrome Carbide. Includes: three bars ¼" square x 2"; two bars ¼" square x 1"; three bushings 5/16" long, ½" O.D., 5/16" I.D.; one rod ⅛" diameter x 1" long. (Bulletin WR-104 included.) Samples adequate for wide range of metallurgical and chemical tests. Additional information relative to your application free, on request, from Carboloy engineers. Order kit for your preliminary testing today. Check new Grade 608 Chrome Carbide against your requirements *now*. See properties and test results below.

Properties and test results of Grade 608

THE OUTSTANDING properties of Grade 608 Cemented Chrome Carbide promise to open new cost-saving applications throughout industry. You may wish to expedite your initial test appraisals by starting with the above test kit now, pending larger quantities or supplies as production facilities expand.

Physical Properties

(Grade 608)

Composition: 83% CR_3 C_2
2% WC
15% Ni

Hardness (Nominal): 88 Rockwell "A"

Density (Nominal): 7.0 gms/cm³ (Slightly lighter than S.A.E. 1095 steel)

Transverse Rupture Strength: 100,000 P.S.I.

Coefficient of Thermal Expansion: 6.4 in range of 70° —1292°F.

Relative Abrasive Resistance: Dry Al Oxide—58.0

Test Results

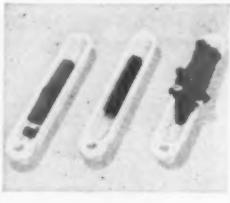
Salt spray. After subjection to a 30% salt spray for 750 hours, Grade 608 still retained its metallic lustre.

Sulphuric acid. With sulphuric acid as the corrosive agent, Grade 608 showed about 30 times the resistance of 18-8 stainless steel, and 3 times the resistance of tungsten carbides.

Nitric acid. Using nitric acid, the resistance to corrosion was approximately 8 times that of other carbides and twice that of stainless steel.

Steam erosion. Tests indicate a resistance to steam erosion approximately 60 times that of conventional carbides.

Lactic or citric acid. Grade 608 was practically inert under all conditions when exposed to lactic or citric acid.



OXIDATION RESISTANCE. (Left to right.) Samples of 18-8 stainless steel, Grade 608 Chrome Carbide and tungsten carbide after exposure in air at 1850°F. for 24 hours. All were originally identical in shape and size. Grade 608 Chrome Carbide appears to be virtually completely resistant to oxidation at all temperatures up to 1000°C. (1832°F.). Samples subjected to 1850°F. were only slightly discolored.

CEMENTED CHROME CARBIDE
abrasion, erosion

New Grade 608 Carboloy Cemented Chrome Carbide, first of the new Series 600 Chrome Carbides, with chromium as principal ingredient, gives high resistance to corrosion or erosion, combined with good abrasion resistance. Opens new areas for carbide benefits, new product design. First sample test quantities now available; production quantities soon. For properties, sample kit, suggested uses of this great new Carboloy created-metal, see below.

Now available for your product designers, process engineers and metallurgists . . . sample test quantities of Carboloy Grade 608 Cemented Chrome Carbide, first in an entirely new series of metallic carbides.

Series 600 Chrome Carbides contain chromium as the principal ingredient. They are cobalt-free and practically tungsten-free. They feature high resistance to corrosion or erosion, combined with good abrasion resistance.

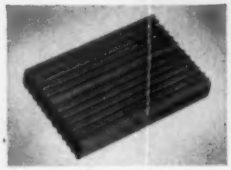
Field tests already point up exciting new areas where Series 600 will bring new cuts in costs, new highs in performance. Undoubtedly, *your* field, *your* product may benefit, too. Use sample kit to start your preliminary metallurgical and chemical tests of Grade 608 today.

An expansion of carbides

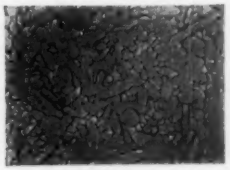
Series 600 Chrome Carbides are light in weight, completely nonmagnetic and have a coefficient of thermal expansion about the same as that of steel. They are as machineable and as hard as tungsten carbides. They are stable and strong.

Fabricating and finishing techniques are the same as tungsten carbides. A flash plating of nickel makes Chrome Carbide blanks (as sintered or as ground) readily brazable with conventional brazing materials.

Series 600 may overlap a few tungsten carbide applications. But because of their unusual wear-proofing properties, their wear- and corrosion-resistance, look to Chrome Carbides for famous carbide benefits in many new areas of industrial and product applications. Here may be new opportunities for you, starting with Grade 608.



GAGE ANVILS currently being made of Grade 608 Chrome Carbide. In gage blocks, ring gages, plug gages and gage anvils, Chrome Carbide has already shown an outstanding ability to resist corrosion and abrasion. Since its coefficient of thermal expansion is about the same as that of steel, readings are not affected by temperature variations.



MICROSTRUCTURE of Carboloy Grade 608 Chrome Carbide shows appearance unlike any other metal. Note, particularly, the uniformity and interlocking character of the grain structure. Chrome Carbide is lighter in weight than tungsten carbide; facilitates handling and use of solid carbide. It will pay to start your laboratory tests on Chrome Carbides now.

WHERE CAN YOU USE GRADE 608 CHROME CARBIDE?

Field tests indicate new Series 600 Chrome Carbides offer unusually high resistance to corrosion or erosion combined with good abrasion resistance. For example, the following applications are suggested for Grade 608. Where else can you use Grade 608 Chrome Carbide?

- **Shear blades for molten glass**
- **Core pins for baking ceramic parts**
- **Fishing rod guides**
- **Centrifuge nozzles, separating equipment**
- **Bearings where corrosives are present**
- **Textile guides**
- **Nozzles and valves: soaps, fats, oils, foods, chemicals, petroleum products, pharmaceuticals, fruit juices**
- **Valve and core pins, die casting**
- **Punches for movie film**
- **For many applications where stainless steel is not sufficiently abrasion-resistant**

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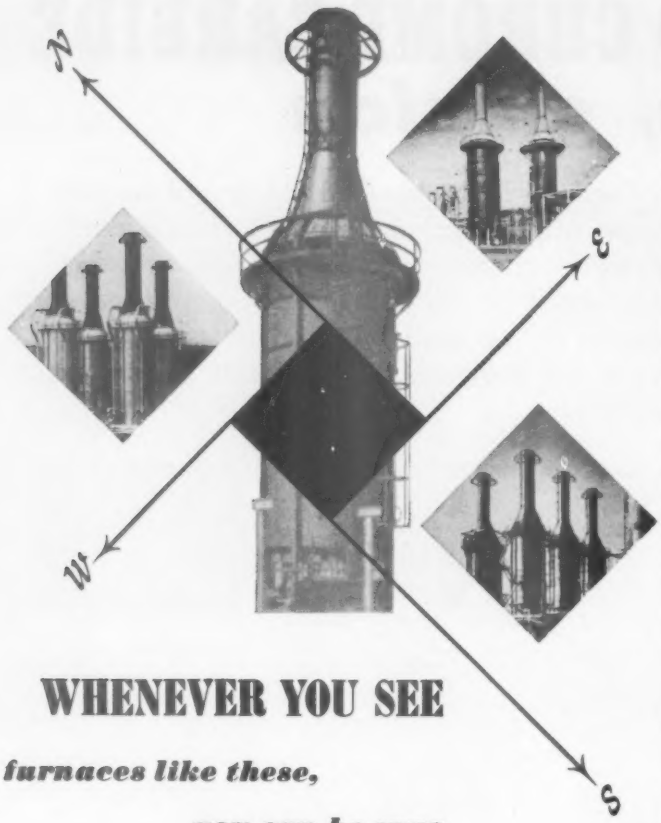

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operating temperature for direct-fired reboilers is one of the answers to reduced corrosion-erosion and elimination of tube burnout.

Total concentration of acid gas in the amine solution is held relatively low in design of these skid-mounted plants. This condition, plus lowered reboiler temperature, are the secret to reduced corrosion. These two factors determine basically the size of regeneration equipment, pumps, and exchangers. Consequently a given installation is dimensionally proportional to sourness of the gas which it is designed to treat as well as gas flow rate.

Type of cooling equipment, particularly for the reflux system, is dependent on load. Either water or air is suitable for the cooling medium. For the smaller units where reboiler load does not exceed 250,000 B.t.u. per hour, air-convection cooling is satisfactory. Although the type of reflux exchanger equipment is primarily determined by its duty, economics of the over-all plant is an influencing factor.

The skid-mounted desulfurizer for well-head installation, described here, is a product of Black, Sivalls & Bryson, Inc., Oklahoma City.

Analysis and Design of Pipe-Line Spans

(Continued from page 113)

for the pipe-line section might be. In the case of the 34 by $\frac{7}{16}$-in. or ½-in. wall pipe, a decrease benefit results because of the lower value of the minimum specified transverse yield strength of the pipe which we are using for an example. However, this study shows that spans up to 140 ft. might be considered acceptable using 34 by $\frac{7}{16}$-in. wall-thickness pipe in the 34 by $\frac{7}{16}$-in. pipe-line section, without incurring a factor of safety at the span which is less than that of the buried pipe-line section.

Another span design suggested in order to obtain an increased length of allowable span is the use of pipe which physical tests have shown to be of better quality than the minimum standards that the pipe specifications have required.

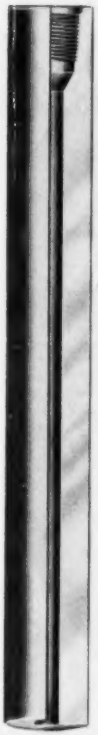
Fig. 4 shows the results of such a study where it has been assumed that pipe with higher values of transverse yield strength and longitudinal yield strength was available. As in the previous charts, a temperature increase of 50° F. at the span has been used. Also the internal pressure corresponding to 72 per cent of the minimum specified transverse yield strength of the pipe-line section has been used

Use these Helpful Facts to insure maximum Drill Collar Performance!

A Drill Collar is one of the most deceptive of all drilling tools. It looks so simple—just a hollow bar of steel. But a good Drill Collar contains more hidden qualities . . . more years of "know how" . . . more testing, checking and rechecking than probably any other drilling tool—certainly far more than most oil men realize!

Most oil men know the importance of a straight, concentric bore in a Drill Collar—and you get this in every Baash-Ross Drill Collar. In fact, Baash-Ross Drill Collars are held to wall-thickness specifications so rigid that, for a 2-1/4" bore or larger, *the wall-thickness cannot vary more than 1/16" for each 10 feet of product length!* And overall straightness of each Baash-Ross Drill Collar is held to unusually close limits, too—*within 1/8" of absolute true over the entire length!*

But probably the most important points in long life and top Drill Collar performance can't be seen. They have to do with the metallurgy and heat-treatment of the steel itself—*and they are vitally important.* To insure maximum returns from your Drill Collar investment, remember the three important points outlined at right.



Bottom connection can be pin (above) or box (below).

First

. . . in selecting the steel to be used in a Drill Collar, chemical specifications alone are not enough!

For example, simply specifying that a Drill Collar be made of a certain AISI specification steel—or any emergency substitute—permits far too great a variance of alloys to obtain uniform physical properties in the finished product.

Alloys that produce uniform properties when used in small cross-sections produce entirely different sub-surface properties when used in a thick-walled Drill Collar. Therefore, the steel used in Drill Collars should be selected by the "hardening characteristics" as well as by chemical specification.

Baash-Ross does this by checking the "End Quench Hardenability" index of each individual heat of specified steel to determine exact hardening characteristics. Then, based on this test, each heat of steel is separately classified as to the size of product cross section that particular steel is to be made into to secure the desired uniform physical properties in the finished product.

Thus, Baash-Ross assures each Drill Collar having accurately-controlled sub-surface as well as surface physical properties. Repeated re-cuts can be made on the threaded ends without sacrificing thread strength or hardness!

Second

. . . specifying that the Drill Collar is to be of press forged steel is not enough!

Although forged steel is denser than rolled steel, the really important thing is how the forging is processed—the way it is heat-treated to develop the forging to its best physical properties.

Through years of experience, Baash-Ross has learned that these processing steps are quite critical and must be accurately controlled to produce a Drill Collar free of structural defects and residual stresses. First, the forged bar is normalized and tempered over its entire length in one operation to produce a stress-free homogeneous structure with the desired physical properties.

After the bar has been machined to the specified outside and inside dimensions, each end of the Drill Collar is again treated by an oil quench and tempering operations to produce the required uniform physical properties necessary for the threaded end zones.

Thus, a forged Drill Collar is produced that is free from residual stress to assure sustained straightness—with high impact values to resist shock loading—and with the end zones of such uniform physical qualities as to permit repeated recutting without reduction of original joint strength!

Third

. . . specifying the size and type of joint desired on the Drill Collar is not enough!

Almost any machine shop can cut joints that will reflect proper gage standoff and will thread together. But the important thing is whether the joint is machined to obtain its full designed efficiency. Joints that are not produced with accurate thread form, lead and taper will permit wobble and cause failure. Furthermore, joint alignment in Drill Collars is particularly important because the rigidity of these members concentrates mis-alignment stresses on the threaded connections and is the most common cause of joint failure in Drill Collars.

Baash-Ross assures accurate thread form, lead and taper in every joint by a prescribed method of checking and gaging that goes far beyond standard gaging standoff tests. Then the alignment of every joint is precisely checked with a Baash-Ross Alignoscope* to assure its not varying by more than 1/10 of 1% of theoretically perfect with respect to the longitudinal axis of the Drill Collar—virtually perfect alignment!

**Write Baash-Ross Tool Co., Los Angeles, for descriptive data on the Alignoscope and its unique features.*

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Hidden Values

in Red-Strand wire rope?

You get 3 important, unseen values in Hercules *Red-Strand*.

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The second is *consistently high performance*.

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(maximum allowable according to Division 2, Section 2, A.S.A. Code for Pressure Piping).

This study shows that spans up to 150 ft. might be considered acceptable using the same wall thickness of pipe for the spans in a pipe-line section when the pipe is selected specially for this application.

As might be expected, a combined study of the use of heavier wall-thickness pipe and higher than average physical test pipe will show a further increase in the allowable length of pipe-line span. This is indicated by the curve for $\frac{1}{2}$-in. wall-thickness pipe used in a $\frac{7}{16}$-in. wall-section pipe line which is shown on Fig. 4.

Precautions . . . This method of analysis of pipe-line span design should not be considered as the only analytical study which is necessary when designing spans. All mention of supported spans has been intentionally omitted since other factors in addition to those which have been presented here enter into the design studies when supports are being considered. In addition nothing has been said about the magnitude of longitudinal compressive stresses which might be considered limiting in this pipe-line span design.

In the application to the 34-in. Topock-Milpitas pipe line this stress was considered limited at values of about 20,000 psi., or a factor of safety of 2 based upon the longitudinal yield strength of the pipe. In this application this was a safe value since the physical sizes and span lengths were such as to rule out any concern about pipe buckling under compressive loads.

For a pipe-line span, where unusual conditions of external loadings or unexpected changes in the original piping installation might be expected more frequently than in the buried section of a pipe line, a design carried to the limiting factor of safety of the code might be considered ill advised.

References

1. U. S. Department of the Interior, "Boulder Canyon Project, Final Report, Part IV—Design and Construction, Bulletin 5, Penstocks and Outlet Pipes," p. 82.

2. Marin, Joseph, "Failure Theories of Materials Subjected to Combined Stresses," Transactions A.S.M.E., Vol. 101 (1936), p. 1162.

BOOK

ELECTRICAL WELL LOGGING FUNDAMENTALS. By Hubert Guyod. Published by Well Instrument Developing Co., Houston. 164 pp. Plastic-ring bound.

This is an original printing of two papers, two charts, and a reprint of 25 articles which appeared in various petroleum publications.

Lion Chemical Co.

(Continued from page 97)

ammonium formate. A caustic scrubber removes any remaining carbon dioxide before the gas is compressed to 5,000 psi., prior to synthesis. A regenerating unit is provided for the copper liquor while the spent caustic is discarded.

Synthesis . . . The final synthesis step occurs at a temperature of 977° F. where the hydrogen and nitrogen are united in the presence of a promoted iron catalyst. Since only a portion of the gas is reacted during its initial pass through the catalyst bed, the unreacted gas must be recirculated through a synthesis loop system.

A material balance is maintained in the loop between the liquid ammonia being withdrawn and the incoming gases. The ammonia product is piped to storage spheres, tank cars, or other sections of the plant for further processing.

"Natural gas for plant . . . from fields just below Ark.-La. line."

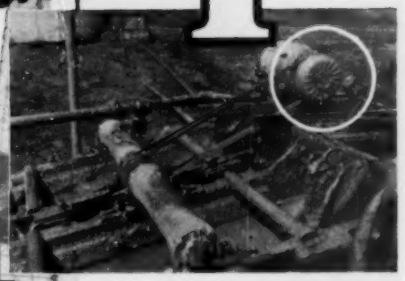
Other products . . . The ammonia forms the base for end products used as fertilizers. Other sections of the plant are devoted to the production of the intermediates which are used in the synthesis of ammonium sulfate and nitrate *(The Oil and Gas Journal, July 12, 1951, p. 79)*. Two nitric acid plants have a combined capacity of 475 tons. A sulfuric acid plant utilizes 100 tons of sulfur to produce 290 tons of 98 per cent sulfuric acid daily.

Plant background . . . The plant, originally known as Ozark Ordnance Works, was constructed by the U. S. Government at a cost of approximately $28,000,000 to produce anhydrous ammonia for wartime uses. Lion operated the installation for the Army Ordnance Department during the war years. In May 1946 the plant was leeased by Lion and on March 2, 1948, was purchased outright from the Government. Since that time the company has expended $11,000,000 to extend the original facilities and diversify the product lines.

Except for some fuel gas supplied by company-owned wells, natural gas is purchased from a utility company and is transported from gas fields just below the Arkansas-Louisiana line.

Plant personnel at El Dorado include A. M. Sprague, plant superintendent; R. L. Van Zandt, assistant plant superintendent; F. L. Emert, chief engineer; G. S. Mitchell, chief chemist; and G. D. Rucker, plant production superintendent.

Eliminates 1 shocks from shakes



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Wartime Capacity of Refinery Is Trebled

(Continued from page 95)

utilization of the two reactors, rearrangement of heat exchangers, catalyst-recovery equipment, relocation of reactor grids, and reduction of erosion in lines carrying fluid catalyst.

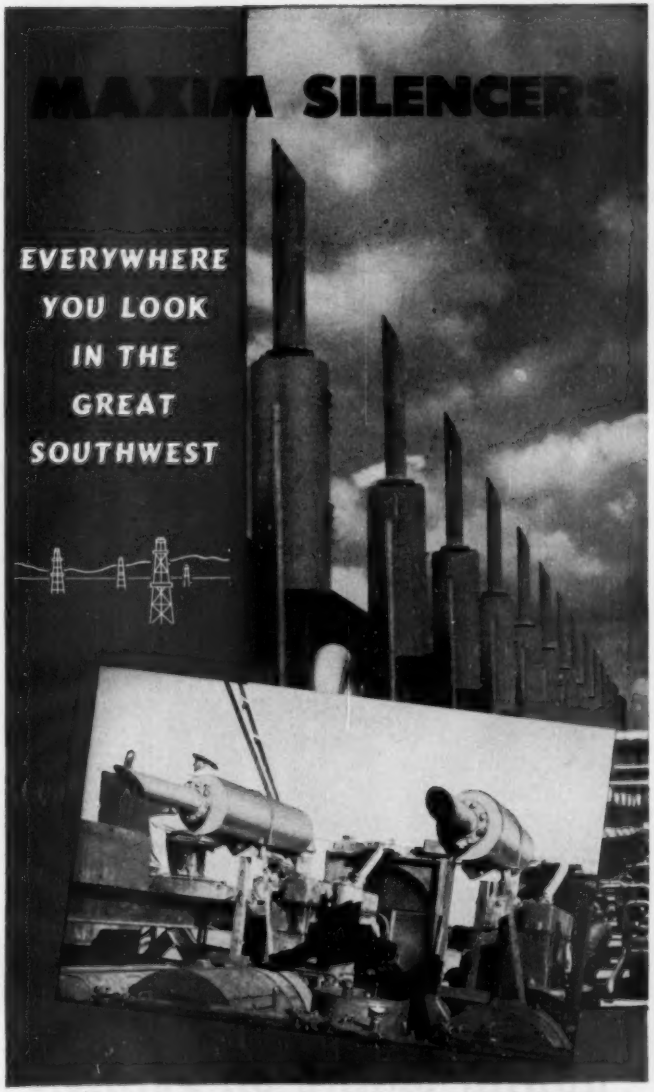
Reactors . . . Operating for aviation-gasoline base-stock production the two reactors were in series flow with the second reactor retreating the gasoline effluent from the first reactor. Since production of motor-fuel-quality gasoline can be effected without the retreating step, the second reactor now operates on a charge of heavy cycle oil plus surplus virgin feed stock over and above the capacity of the first reactor. In this manner the capacity of the catalytic cracker was increased nearly 50 per cent over the original design with the additional advantage of selective cracking of available feed stocks.

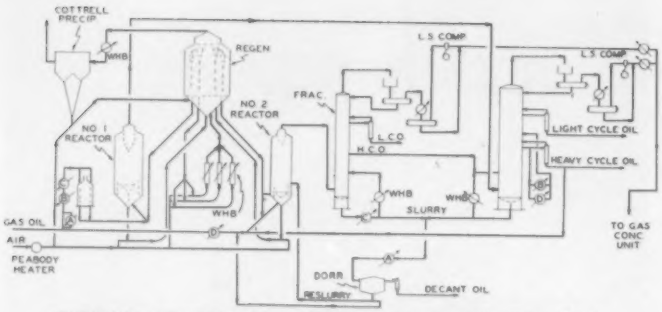
Improvement in performance was obtained by the installation of annular stripping sections in the reactors to insure better contact between catalyst and stripping steam. After installation of the annular stripping sections, minimum reactor levels were somewhat higher than previously. When proper catalyst recovery was achieved much higher catalyst quality resulted by withdrawing total unit catalyst, instead of fines only, which also improved unit yields and capacity. However, with minimum catalyst level this resulted at times in higher conversion than was desired even at minimum temperature.

To correct this condition the grid in the larger reactor was raised to permit operation at lower catalyst level. Should future operating requirements demand greater bed depth, maximum catalyst holdup has been lowered very little and there remains adequate reactor space to raise the bed level. The grid in the second reactor will likewise be modified at the next turnaround which will further improve flexibility.

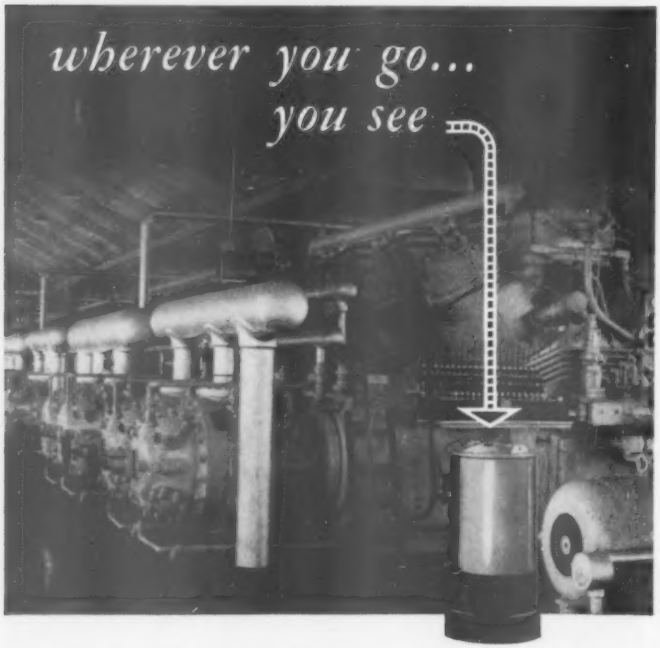
Catalyst coolers . . . As originally installed, three recycle catalyst coolers on the regenerator were run in parallel and used to preheat the oil charge to the unit. This arrangement proved to be unsatisfactory. Because of inadequate control of the coolers, considerable coking was experienced, and in order to free one cooler which might be restricted, the flow of catalyst through the single standpipe had to be shut down. This in turn required a readjustment of heat balance on the unit.

To eliminate this bottleneck the standpipe was split into three pipes





CATALYTIC CRACKING UNIT flow chart at the enlarged refinery. Fig. 3.



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"Catalyst loss appreciably reduced . . ."

with three separate risers and three slide valves, providing much better control of the catalyst flow and also allowing one cooler to be taken out of service without affecting the flow of catalyst through the other two coolers or seriously upsetting the best balance.

Catalyst recovery . . . The loss of finely divided particles of catalyst in the flue gas from the regenerator was appreciably reduced by replacing the single-stage cyclone separators with the two-stage cyclone separators. The two-stage cyclones reduced the amount of catalyst fines in the regenerator flue gas which decreased the heat load on the waste-heat boilers resulting in lower velocities through the Cottrell precipitator. These changes have reduced catalyst losses to a satisfactory minimum.

A Dorr thickener was installed in the slurry flow returned to the reactors permitting most of this high-coke-producing stock to be yielded to fuel oil. This also increases cracking capacity.

Venturi mixers . . . The flow of spent catalyst into the regenerator causes an excessive amount of erosion in horizontal lines connecting with standpipes from the reactors. It is also necessary to maintain velocity in these carrier lines to prevent clogging with catalyst. A venturi-type restriction was installed in the horizontal line with the flow of catalyst from the reactors being directed into the throat of the venturi. The injection of carrying air into this throat produces a high velocity and eliminates the clogging of the carrier lines as well as reduces erosion.

Turbine difficulty . . . An interesting maintenance accomplishment occurred during an extended run of the catalytic cracker when one of the two turbo blowers supplying air to the unit had to be shut down. In the course of operation, the turbine driver threw several blades in the first row of blading and these in turn stripped out stationary and moving blades in the rest of the turbine.

No spare blades were on hand, and no time was available to await the delivery of spares from the factory. Maintenance crews removed one complete row of moving blades, balanced a second row by removing an equal number of blades on opposite sides of the wheel, hammered some of the blades back into shape. balanced the driver, and placed the turbine back into service. Under these conditions, the unit was able to continue normal

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Welding electrodes and welding procedures to be employed are determined by our welding laboratories. Nothing is left to chance in this critical phase of production.

Statistical quality control procedures are employed to keep all manufacturing operations within the required tolerances.

And then, the engineering itself is tested during fabrication, as in the case illustrated. Components receive the most critical inspection and testing to be sure that the final assembled unit meets every specification exactly.

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Fractionator-absorber . . . Conversion was made of an idle fractionator to an absorber which replaced a smaller-diameter absorber previously in use. Alterations were also made to an idle isomerization unit to deethanize and dry the propane. Other equipment in the gas-recovery unit includes a rich-oil depropanizer and debuntanizer, catalytically cracked gasoline stabilizer, straightrun depentanizer, and pentane splitter.

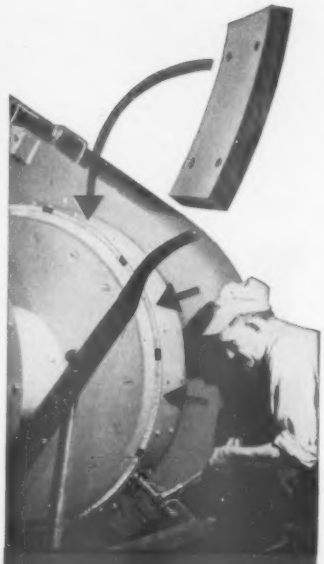
Operations of the unit with the large absorber provide a 99 per cent recovery of butanes and over 95 per cent recovery of propane. Propylenes from the unit are being used as feed stock for the alkylation unit, increasing the net return from the unit.

Treating . . . The plant has been processing relatively sweet crudes to date and product treating has not proved to be a problem. However, in anticipation of some crude to be obtained from West Texas via the Rancho pipe line now under construction a dry copper treater is being installed for use with kerosine and gasoline.

Stabilization, meanwhile, removes H_2S from low-end-point straightrun gasoline and from catalytic gasoline, neither of which contains appreciable amounts of mercaptan sulfur. Full-range straightrun gasoline is caustic-washed to complete the removal of H_2S after stabilization. Distillates produced require no further treating after steam stripping on the still. Butane production requires only a caustic wash for H_2S removal.

Utilities . . . The plant has three 250,000-lb. per hour boilers operating at 450 psig. and 500° F. Most of the pumps are steam driven and a 1,500-kw. generator is operated on exhaust steam. Also included are two 750-kw. gas-engine-driven generators. Recently a new 2,500-kw. turbogenerator was installed.

Alkylation unit . . . A major revamping of the hydrofluoric acid alkylation unit



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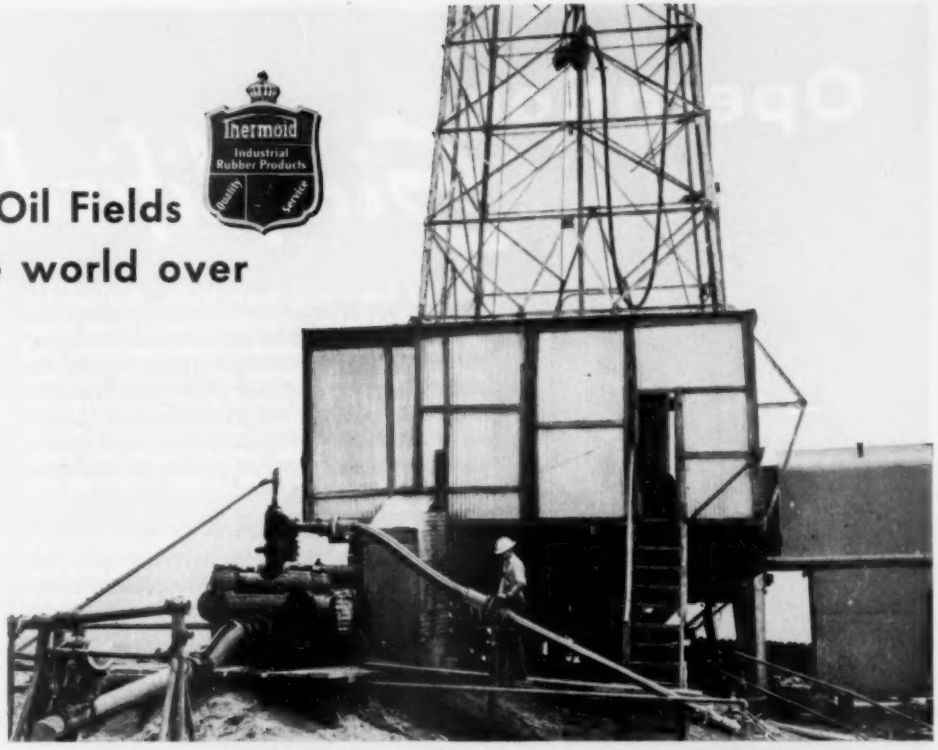

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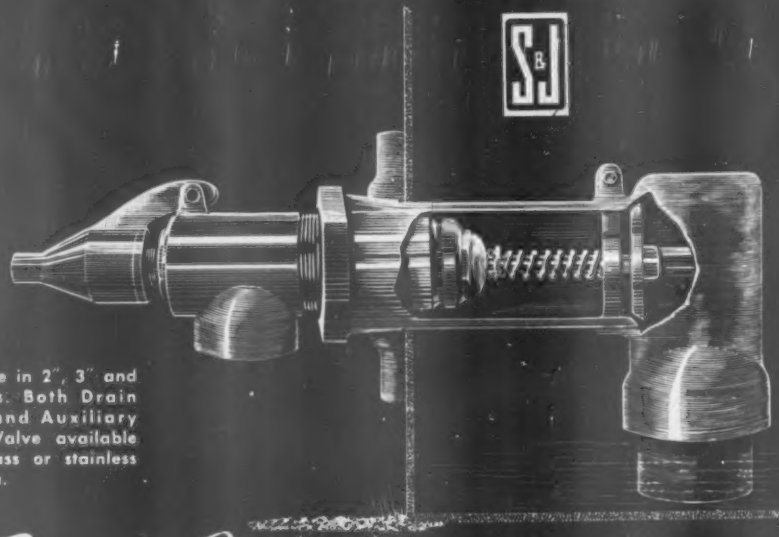
In the illustration of Model ST-2001-AV shown below, the Anti-Freeze Drain Valve is screwed into an auxiliary shut-off adapter sleeve, which permits removal of the valve from the tank without having to drain its contents. With the valve functioning, manual operation opens the auxiliary to give full flow characteristics; closed, the auxiliary is also self draining.



Available in 2", 3" and 4" sizes. Both Drain Valve and Auxiliary Safety Valve available with brass or stainless steel trim.

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"This Phillips refinery . . . 65 miles southwest of Houston."

was undertaken during the past year and the rehabilitated unit was placed in service in September 1951 to produce alkylate for use in aviation-gasoline blending.

The unit had been left idle until the start of the Korean hostilities and was placed back into service to help meet the increased defense requirements of the Armed Forces.

Prime change in the system involved conversion of the HF stripper tower, used for stripping HF from the hydrocarbon stream, into a catalytic defluorinator. Further changes were made by the inclusion of a propane stripper and vent gas absorber and internal modifications were made to the acid contactors. Changes were also made in the bauxite dryers to afford greater service from fewer dryers.

Propylene alkylation was incorporated in the modifications to increase alkylate yield. The production of alkylate is presently limited by feed-stock availability; however, in event of an emergency and with outside feedstock available, expenditure could be economically made to increase production of alkylate to nearly double the original design capacity.

Crude supply . . . The plant obtained its original supply of 25,000 bbl. of crude per day essentially from Old Ocean field and was designed to operate on this particular stock. As the plant increased in size, other coastal crudes were brought into the refinery to augment the Old Ocean production.

In addition, a supply of crude from Chocolate Bayou, mixed with 40 per cent natural gasoline and butane, is obtained from Phillips' Bayou gasoline plant. This crude is stored in two new 150,000-bbl. floating-roof tanks after blending with other stabilized crudes to reduce its vapor pressure to a suitable level.

With the completion of the Rancho pipe line, crude will also be obtained from West Texas.

History . . . The plant site is 65 miles southwest of Houston in Brazoria County, adjacent to Old Ocean field and cycling plant. It was designated as Plancor 880 under Petroleum Administration for War during World War II and was built and operated by J. S. Abercrombie and Harrison Oil Co. At the conclusion of the war in 1945, the plant was shut down.

The refinery was acquired by Alamo Refining Co., subsidiary of Phillips Petroleum Co., in June 1947, from War Assets Administration.

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No. 1 of a series of 6

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Separator, Tanks Aid in Taking Drill-Stem Tests

AN operator in West Texas uses a separator and tank hookup on his wildcat wells in order to keep a check on any drill-stem tests which he might make. By having the separator and tanks on hand, it is simple for him to hook them up and measure production while the well is on test *(see top photo)*.

The procedure is to set up the tank and separator and connect them up with a vent line from the separator for measuring the gas production. A line is then laid to the derrick floor so that an easy connection can be made to the drill pipe before the test tool is opened.

Pipe is pulled . . . During the course of drilling or coring, if a likely stratum is encountered, the drill pipe is pulled and the test tool installed. The pipe is then run, the packer set, and the tool opened into the separator.

A quick gage on the amount of liquid produced in the tank and the amount of gas produced will give the gas-oil ratio, water-oil ratio, and other pertinent facts without depending on looking at the blowoff line from the well.

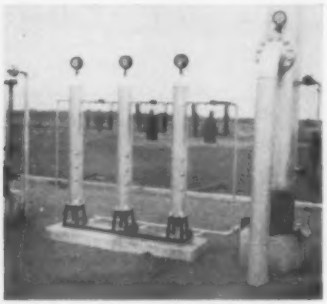
Obtaining Instrument Gas

Instrument gas at various pressures may be obtained through construction of expansion chambers connected in series with pressure regulators.

The expansion chambers may be any size pipe, blocked off at each end and mounted in vertical positions. Connected to the top of each chamber is a pressure gage and connected to the bottom is common piping, with suitable fittings, for draining off any accumulation of liquids.

Each expansion chamber may have any number of taps connected for tying into instrument gas lines.

The pressure regulators are so con-



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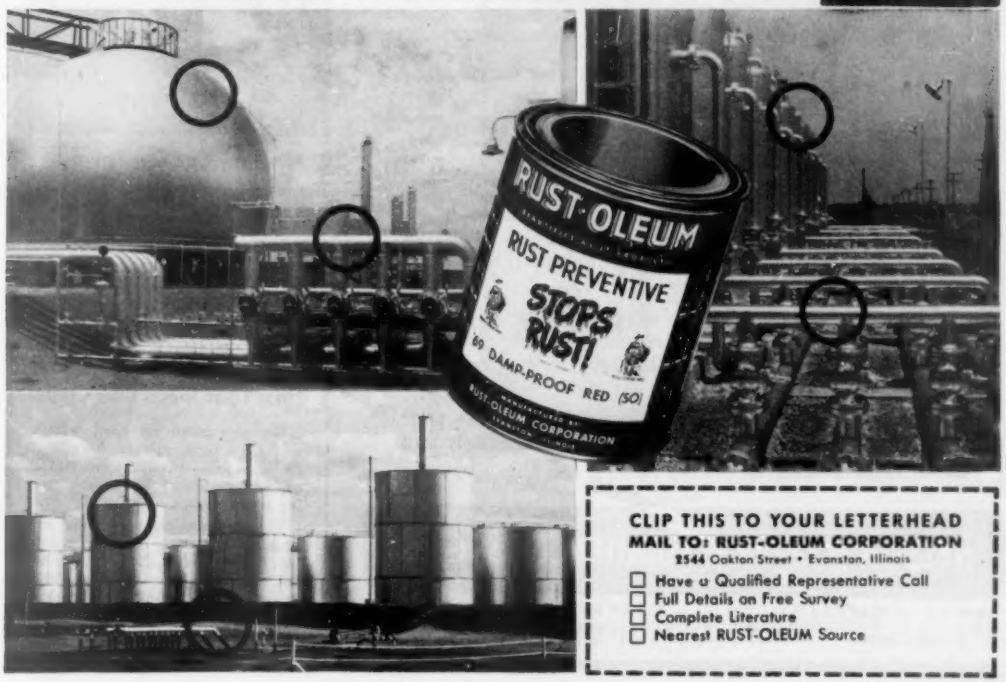

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nected that each may be bypassed or removed completely for repairs should the need arise.

The particular installation depicted is used at a gas-dehydration station. Dehydrated gas passes through a pressure regulator, then into the first expansion chamber. From this chamber it passes through two more sets of regulators and chambers.

An outlet line from the last chamber in series (with the lowest pressure) is used for obtaining fuel gas as required at the station.

Water Supply Aids Safety During Drilling of Wells

When returns during drilling of a well show gas-cut mud, a simple safeguard which will contribute greatly to safety on the rig floor is a water connection to each of the exhaust pipes on the engines to keep any gas from igniting from the backfire of an engine. (Note installation in photo.)

One operator runs a water line from the fresh-water system beneath the exhaust pipes and connects it to the lines by means of rubber hoses. One valve at a point farthest removed from the well head is used to open and shut off all the hose connections.

Valves on each of the risers are used in case one of the engines is down, but they are opened as soon as the engine is started.

Whenever the mud shows signs of cutting or when high-pressure gas sands are expected, the water is turned on and the individual valves adjusted to cool the exhaust gases so there will be no danger of igniting the gas.

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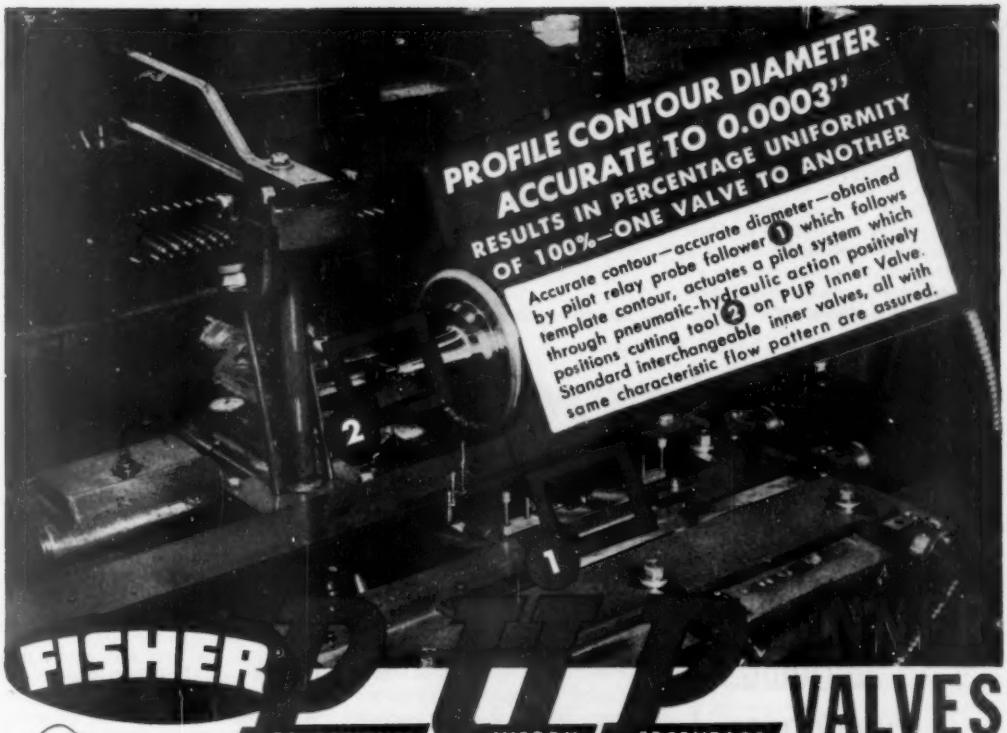
The Journal pays cash for all acceptable items. Address yours to: Editor, "On the Job," The Oil and Gas Journal, Box 1260, Tulsa, Okla. Photographs and manuscripts will be returned if requested.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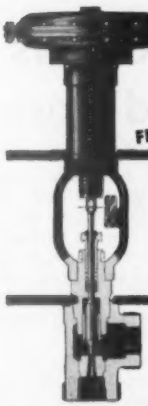

Type 57T-DA direct acting diaphragm motor valve showing Micro-Form Pup in Fisher high pressure cast steel Design "D" angle body.

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Heatless Treater

Injection-type unit cited for economy, dependability

A HEATLESS oil treater which does not require any special chemical and which offers substantial savings is now being manufactured.

The treater's advantages include savings in initial-equipment cost and installation, and no upkeep expense because it is made of the same materials as the flow line and will last as long.

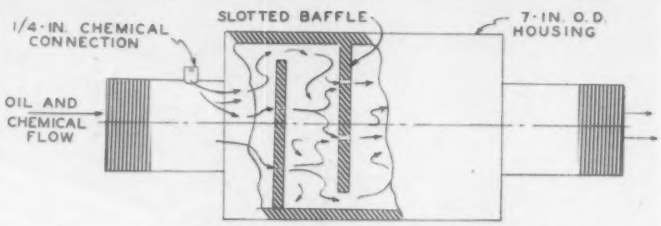

DIAGRAM OF TREATER, showing how chemical is injected into fluid stream.

In addition, the treater has no moving parts, and, since it does not use heat, gravity of oil does not decrease, and there is a substantial elimination of paraffin accumulation downstream from the treater.

Chemicals used are those for sale and recommended by the treating company's representative after a usual sample-checking procedure. Chemical is injected into the stream by any type chemical pump.

Injection . . . The treater conducts the chemical-laden fluid through a series of baffles, containing slots. In doing this the chemical is thoroughly mixed with the fluid stream, which is subjected to the right amount of impact and flow reversals. The impact and turbulent condition tear apart the strong elastic film around the water globules, which unite, grow larger, and settle out.

The heater is manufactured by L. G. Sales Co., Inc., Oklahoma City.

Splicer Repairs Damaged Hose

HOSE lines which have been cut or damaged may be conveniently repaired with an assembler which can be easily fabricated in any machine shop.

The unit, used by Sinclair Refining Co., Houston, makes the insertion of couplings and nipples a simple task and thus can be used to salvage hose which might be accidentally cut and which otherwise would be useless.

The assembler consists of two brass cylinders with fittings at one end to permit the simultaneous entrance of air into both cylinders. A rod in each cylinder is attached to a moving vise which travels along a guide rail. A stationary vise is the other main portion of the assembly.

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At no cost to you, Fluor will inspect to determine repairs necessary to bring it back to original efficiency, will furnish a complete written report, a blueprint and itemized statement of materials needed and will bid for the job competitively.

Regardless of the make or model, Fluor will repair it economically—on a contract or cost-plus basis. We have the experience, the men, materials and facilities to handle the entire job or any part of it. Inquire through any Fluor office.

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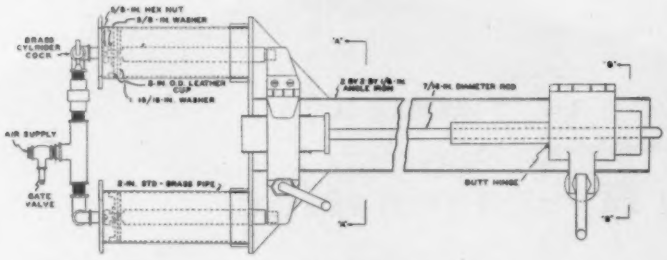


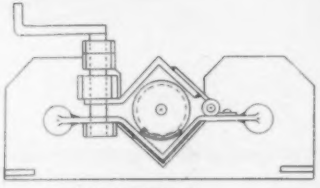
DIAGRAM of hose splicer used by Sinclair Refining Co., Houston.

Operation . . . The unit operates on an hydraulic principle, with the twin cylinders made out of 2-in. standard brass pipe and with air used as the driving force. Entrance of air into the cylinders is controlled by a simple gate valve and forces the two rods, attached to the traveling vise, to travel in a horizontal direction. Air is released from the cylinders through a brass cylinder cock installed at the end of the cylinders with necessary fittings.

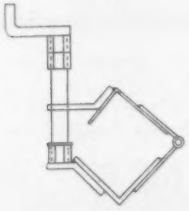
One end of the hose is clamped into the moving vise; the nipple, or the other end of the hose with the nipple previously inserted, is clamped into the stationary vise, and the movement imparted to the moving vise by the two driving rods forces the hose upon the nipple.

The travel of the hose is guided by a rod and the length of angle iron.

Once the union has been made, the hose may be slipped out of the vises, appropriate clamps attached, and then be ready for use. The entire operation may be completed in a matter of minutes.



SECTION "A-A"



SECTION "B-B"
ALL PARTS WELDED

CROSS-SECTION of hose splicer. Unit can handle any length of pipe.

Vise arrangement . . . The vises consist of two pieces on angle iron hinged at one end with an extension arm attached to a handle so that pressure may be applied by rotation of the handle. Small sections of old couplings, having a total arc of roughly 120°, are inserted in the vises to act as hose grippers and also to act as spacers to handle any size of hose.

The particular assembler shown in diagram form was made with 2 by 4 by ⅛-in. angle iron and can accommodate hoses slightly smaller than 2-in. o.d. A larger unit could easily be constructed.

UNCOVER PIPELINE FASTER, CHEAPER with the Sherman Power Digger

For pipeline maintenance in any terrain—leak repairs, service taps, anode installations and so on—this sturdy, compact hydraulic digger uncovers pipeline faster, at lower cost. Fitted to a light, rubber-tired tractor, it works where other equipment is impractical. Travels quickly from job to job. Cost-cutting performance proved in thousands of applications.

The Sherman Power Digger swings in 140° arc. Reaches 8 feet below grade. Precise finger tip control. Digs mud, hardpan, gravel, shale, and stony ground.

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REGENERATION of

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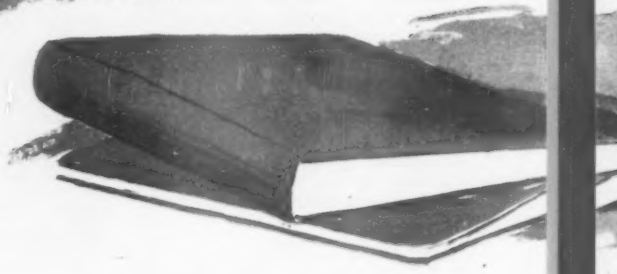
catalyst solves a lot of problems



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Look at the catalyst itself — specifically designed for the job it is intended to do — highly active — long lasting. And because it operates under mild conditions — free from intense heat— a smaller quantity of catalyst is needed. *It's a matter of record.*

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SECTION

No. 18

PUMPS:

Minimum Continuous Safe Flow of Centrifugal Pumps—1

by E. C. Condict*

LIQUIDS in a centrifugal pump will flash into vapor when the capacity being pumped is too low. Knowing when this will happen and how to prevent it means every operator can avoid this trouble.

Heat is generated whenever work is done. The work used by a pump to increase the pressure of the liquid makes it heat up. When the capacity is large enough to carry off most of this heat, the temperature of the liquid passing through the pump will rise only a few degrees. The heat is not carried away fast enough at small flows, causing the temperature of the liquid to rise and flash into vapor.

The smallest flow at which a centrifugal pump can be safely operated is called the minimum continuous safe flow. If the pump is run continuously at less than this amount, the liquid in the pump will flash.

Temperature rise . . . The amount the temperature of the fluid can rise before flashing is known as the allowable temperature rise. Suction conditions determine NPSH (net positive suction head) expressed in feet of the liquid being pumped measured at the centerline of the pump. NPSH is the net head above the vapor pressure corresponding to the temperature of the liquid being handled.

The allowable temperature rise is found by converting the feet of available NPSH into PSI. Then add this PSI to the vapor pressure corresponding to the temperature of the liquid being pumped. This pressure is the vapor pressure corresponding to the temperature to which the liquid may be raised before it will flash.

Once the allowable temperature rise has been established the minimum safe continuous flow can be calculated by the formula:

$$n = \frac{TDH \times 100}{778\,t + TDH} \qquad (1)$$

where:

n = pump efficiency expressed as a percentage.

TDH = total dynamic head in feet.

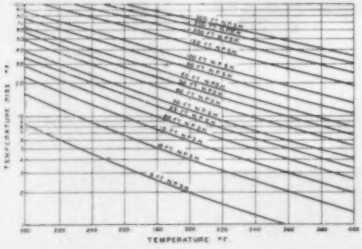
t = allowable temperature rise expressed in °F.

The capacity corresponding to this efficiency is found on the pump characteristic curves.

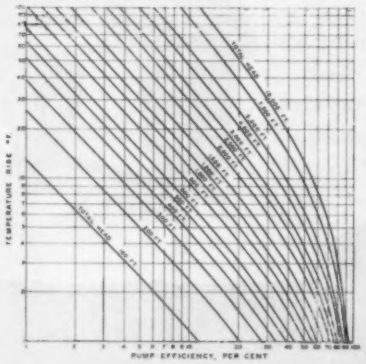
TDH selection . . . The next problem is to select the correct TDH. At no flow the TDH is called shut-off pressure or SOP. The head of a normal centrifugal pump rises constantly to the SOP. Therefore, if the SOP of a pump is substituted for TDH in Formula 1, any error in calculating the efficiency will be on the safe side. Substituting SOP for TDH in formula 1 gives:

$$n = \frac{SOP \times 100}{778\,t + SOP} \qquad (2)$$

Figs. 1 and 2 were developed to eliminate calculations for centrifugal pumps handling hot water by solving the problem graphically. The temperature rise - pump efficiency curves in Fig. 2 may be used for any liquid. Only the temperature-rise curves in Fig. 1 need be changed for other liquids.



TEMPERATURE-RISE curve, as function of NPSH and temperature. Fig. 1.



TEMPERATURE-RISE curve, as function of total head and pump efficiency. Fig. 2.

*Pump engineer, De Laval Steam Turbine Co.

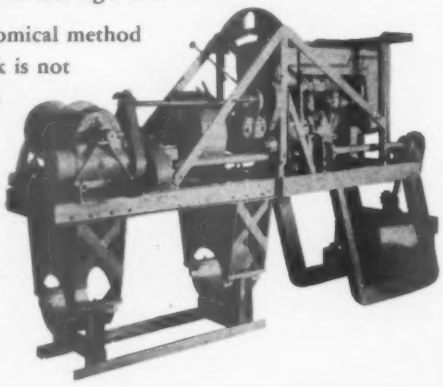
. . . is the right way to bore Crossings!

CROSE

Auger-Type ROAD BORING MACHINE . . .

You don't have to stop traffic to install pipe casing under Highways or Railroads, when you do the job with the Crose Auger-Type Road Boring Machine.

It is the fastest and most economical method of boring crossings where rock is not encountered. Installs casing as boring progresses—eliminates cave-ins. Absolutely prevents settling of concrete slab highways or railroad beds. Extremely accurate in alignment. Adaptable to all sizes of casing from 3" to 34".



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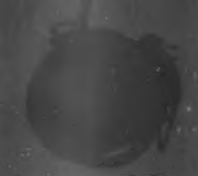

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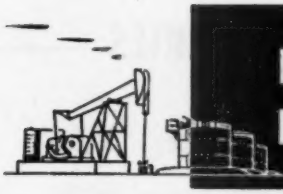


More on Water Imbibition . . .

QUESTION.—"The article in the Journal's August 11, 1952, issue describing Atlantic Refining Co.'s proposal for 'Water Imbibition Displacement' experimental test in Spraberry field was extremely interesting. Can you give me additional literature references on 'water imbibition'?"—A.T.C.

ANSWER.—Yes. A very fine discussion appears in "Mechanism of Fluid Displacement in Sands," by S. E. Buckley and M. C. Leverett (A.I.M.E. Transactions, Vol. 146 pp. 115-116).

The following material from that paper pertinent to water imbibition is given below (reproduced by permission of A.I.M.E.).

Capillary Effects in Heterogeneous Sands

The effects of capillary forces are most noticeable in the production by water drive of reservoirs containing intercommunicating sands of variable permeability. All degrees of heterogeneity are encountered in natural reservoirs, ranging from more or less definite sand layers, each relatively uniform within itself but different in texture and permeability from adjacent beds, to conditions such as more permeable or less permeable zones or lenses within a continuous sand. These lenses may be so small and so numerous as to constitute, together with the enclosing sand, a bed of very irregular properties, or they may be large and fairly uniform within themselves. Since the recovery from the reservoir as a whole depends upon the efficiency with which all parts of the sand are flushed, a study of the mechanism by which water penetrates and floods irregular sand bodies is extremely important.

Prior to production the reservoir may be assumed to be in capillary equilibrium; i.e., at the same horizontal level the capillary pressure is the same in all sands and the capillary pressure and gravity are balanced vertically. At equilibrium the water saturation throughout the reservoir is not uniform, but at the same level is greater in the finer, less permeable sands. When water advances into the reservoir as a result of oil production, the level of zero capillary pressure rises, creating a tendency for the water saturation throughout the reservoir to increase in order to attain a new balance between capillary pressure and gravity. The relationship between capillary pressure, water saturation, and permeability is such that the tendency is for the fine sands always to maintain higher water saturations at equilibrium than the adjacent coarse sands at the same level.

The complexity of natural reservoirs prohibits the formulation of any single quantitative expression relating over-all flushing efficiency to the rate of production, or to any of the other pertinent variables. The factors involved, however, may be illustrated in a quantitative fashion by considering the behavior of a small lens of tight, fine sand embedded in a coarse, more permeable sand at some distance above the original water table. If the rate of production is such that the water table rises slowly enough to permit the maintenance of capillary equilibrium, the water saturation in the coarse sand will gradually increase simultaneously with the rise in the water table. As the water saturation in the adjacent coarse sand increases, the tight lens will imbibe water and expel oil, both by absorbing water at the bottom and expelling oil at the top and by counterflow of water and oil over the entire surface of the lens, tending always to maintain a higher water saturation than that reached by the surrounding coarse sand. Thus the tight sand will at all times be more completely flushed than the coarse sand and will become depleted while oil is still flowing in the surrounding sand.

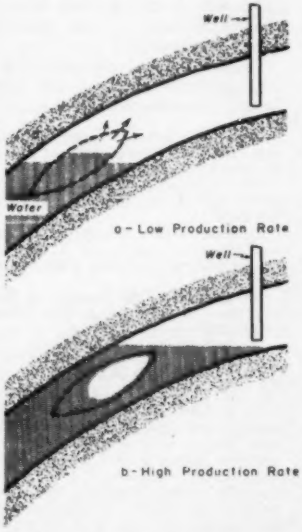


Fig. 1—Effect of production rate on flooding of oil by water from a low-permeability lens.

The higher the rate of production the more nearly the advancing water table assumes the sharp front described in the first part of this paper. Instead of a continuous increase in water saturation, no sensible increase takes place until just before the advancing water front reaches a given position, whereupon the water saturation rises rapidly during the initial phase of the displacement. Under such conditions the tight lens just considered will have no opportunity to imbibe water from the beginning of production, but will become somewhat suddenly surrounded by a zone of high water saturation when it is reached by the flood. Oil may then escape from the tight sand exclusively by counterflow of water and oil between the two sands, an exchange that is slow at best. Furthermore, any oil that escapes from the tight lens may enter the surrounding coarse sand so slowly and into a region of such high water saturation that this oil will not be recovered. Thus, although in time the lens undoubtedly will expel its oil and become substantially water-saturated, as a practical matter it may be considered that the oil was trapped and lost.

A NEW SERIES

. . . starts with this issue

hf... A preface by the author

VAN LOON'S terse but indubitably accurate observation that "India is full of Indians" seems particularly apropos when applied to certain segments of the technical literature. Some subjects have been dealt with most extensively and the literature is filled with reports of work carried out on these subjects by a veritable multitude of skilled research workers.

A classical example of this is the subject of heat transfer. Copious information is available on this subject in a wide range of technical publications. Most of this information has been carefully gathered and intelligently interpreted. The net result, however, is that so much has been done, by so many people, using so many techniques, and obtaining such a variety of results, that to the occasional user of such information confusion reigns supreme.

Further, a wide variety of symbols have been used, and different values often recommended for similar properties. The final result of all this is a great mass or data, quite difficult to use.

It seems fantastic, perhaps, to imagine that more written material on the same subject could do anything but create further confusion. However, one of the major sections of the study of heat transfer has to do with the so-called "film coefficients" which, in many industrial problems, becomes the controlling factor in the transfer of heat. Fortunately, virtually all the possibilities involving heat transfer through a film can be classified into a fairly small number of groups depending on the character of the film, the shapes of the surfaces, the type of flow, and other similar features.

Such a grouping has been made on the opposite page and in similar pages which will appear weekly. Further, the many equations which are reported in the literature on the subject of heat transfer have been studied to find the one which appears to have widest acceptance among the many writers on this subject for the particular set of conditions involved. Equations thus selected are the ones recommended for the calculations of the heat transfer coefficient in each of the several situations which are described. In addition, the symbols in the original versions of these equations have been changed, if necessary, so as to be brought into conformance with those approved by the American Standards Association in September 1946, and the terms have been converted to the English system (B.t.u., pounds, feet, etc.) unless otherwise indicated.

For the most part, reference to theory has been omitted except where limitations and uses are described only by a theoretical treatment. This material is, therefore, not a textbook, but is rather a reference manual designed for the rapid and easy selection of an equation which is suitable for the solution of almost any ordinary problem of heat transfer through a fluid film. Where a theoretical background is required, the user of this manual is referred to any of the several excellent texts on heat transfer as well as the huge number of reports which have been printed in the technical literature on this subject. McAdams and other authors have given hundreds of literature references as a background for their discussion of the theoretical aspects of heat transfer. Bibliographies presented in these texts are, therefore, excellent.

There are many outstanding text and reference books in this field, among them are the following:

Introduction to Heat Transfer, First Edition, (1942) A. I. Brown and S. M. Marco, McGraw-Hill Book Co.

Heat Transmission, Second Edition (1942), William H. McAdams, McGraw-Hill Book Co.

Elements of Heat Transfer and Insulation, Max Jakob and George A. Hawkins, Second Edition (1950), John Wiley & Sons, Inc.

Introduction to the Transfer of Heat and Mass, E. R. G. Ecket, First Edition (1950), McGraw-Hill Book Co.

Applied Heat Transmission, Herman J. Stoever, First Edition (1941), McGraw-Hill Book Co.

Process Heat Transfer, Donald Q. Kern, First Edition (1950), McGraw-Hill Book Co.

Chemical Engineers' Handbook, John H. Perry, Third Edition (1950), McGraw-Hill Book Co.

The several equations have been presented in such a fashion that, except for one item, each page in the manual is an entity. This one lacking item is the numerical value of the physical properties of the material under consideration. These values can often be obtained from the laboratory reports of the users own organization, or when "common" materials are being considered, the figures relating to their physical properties can be obtained from standard sources of physical data, as for example, the International Critical Tables.

Page references to the International Critical Tables and to the more abbreviated tables of physical data appearing in the Chemical Engineers' Handbook are made to assist the user of these equations to find the data applicable to each equation. Other handbooks such as Lange's Handbook of Chemistry and the Handbook of Chemistry and Physics also give tables of data relating to the physical properties of materials.

The author disclaims any credit for originality of any of the equations which have been presented in that all of them have previously been presented and discussed many times over in the technical literature. This compilation has been made simply to categorize known information in a somewhat more easily usable form and to provide a framework for the addition of more up-to-date equations as they become available.

. . . About the Author

B. E. Lauer is head of the department of chemical engineering at University of Colorado, which post he has held since 1946. A native of Oklahoma, he graduated from Oregon State College in 1927, received his master's degree from University of Minnesota in 1929, and his Ph.D. from that institution in 1931. Following a few years as research chemist in private industry, he began teaching in 1934, and has been continuously engaged in that profession since, with the exception of a 4-year military leave. He is a registered professional engineer in Colorado, and is a author of many articles in professional and technical publications. He authorized (with R. F. Hechman) a volume entitled Chemical Engineering Techniques.

Part 1 of a series

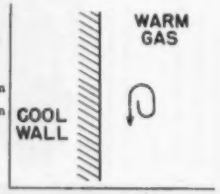
by Dr. B. E. Lauer, Head, Department of Chemical Engineering, University of Colorado

h_f HEAT TRANSFER

COEFFICIENT of HEAT TRANSFER through FILM between SURFACE of COOL VERTICAL WALL and WARM GAS

Gas Movement: Natural Convection

Length of Wall: Short (less than 2 ft.)



EQUATION:

$$h_f = 0.516\,\frac{k}{L}\left[\frac{L^3\rho_f^2\beta_f g\,\Delta t}{\mu_f^2}\cdot\frac{C_p\mu_f}{k_f}\right]^{\frac{1}{4}}$$

TERMINOLOGY:

h_f - Film coefficient of heat transfer, BTU/hr.sq.ft.°F.
k_f - Thermal conductivity of gas at t_f, BTU/hr. ft.^{2} °F./ft.
L - Height of vertical wall, ft.
ρ_f - Density of the gas at t_f, lb./cu. ft.
g - Acceleration of gravity. 4.17 x 10^8 ft./hr.^{2}
β_f - Coefficient of volumetric expansion of gas at t_f; for ideal gas is equal to 1/°R.
Δt - Temperature difference between wall and gas, °F.
μ_f - Viscosity of gas at t_f, lb./ft. hr.
C_p - Specific heat of gas at constant pressure, BTU/lb. °F.
t_f - Film temperature, assumed as arithmetic average of wall temperature and bulk gas temperature, °F.

LIMITATIONS: Equation applicable for values of the function,

$$\left[\frac{L^3\rho_f^2\beta\,\Delta t}{\mu^2}\cdot\frac{C_p\mu}{k}\right]$$

between 10^4 and 10^9.

Applicable to short walls (less than 2 ft.). For longer walls where function above is almost always above 10^9 see equation A 1 a (2). See also graphical methods of reference 8 below.

SOURCES OF DATA: For physical constants for use in above equation see Chemical Engineers' Handbook, J.H.Perry(1948)

for ρ -- see pp. 130-148, 178-195, 1683.
μ -- see pp. 370-374, 1198, 1696.
β -- see p. 200-202.
k -- see pp. 459-461, 1303, 1697.
C -- see pp. 225-236, 297, 1686, 1696.

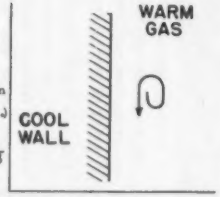
REFERENCES:

1. Introduction to Heat Transfer, Brown & Marco, p.111-115.
2. "The Basic Laws & Data of Heat Transmission," W.J.King. Mechanical Engineering, 57, 550, May 1932.
3. Heat Transmission, W. H. McAdams, pp. 237-251.
4. "Free Convection," W. J. King, Mechanical Engineering, 54, 347, (1932).
5. "Surface Heat Transmission," H. H. Heilman, Trans. Am. Soc. Mech. Engrs., FSP 51, 287-304, (1929).
6. "Physical Constants of Organic Vapors," Industrial and Engineering Chemistry, 35, 1048 (1943).
7. Applied Heat Transmission, Herman J. Stoever, p. 102.
8. "Studies in Heat Transmission," Colburn and Hougen, Industrial and Engineering Chemistry, 22, 522, (1930).

COEFFICIENT of HEAT TRANSFER through FILM between SURFACE OF COOL VERTICAL WALL and WARM GAS

Gas Movement: Natural Convection

Length of Wall: Long (Over 2 ft.)



EQUATION:

$$h_f = 0.13\,\frac{k}{L}\left[\frac{L^3\rho^2\beta\,\Delta t\,g}{\mu^2}\cdot\frac{C_p\mu}{k}\right]^{\frac{1}{3}}$$

or simplified to

$$h_f = 0.13\,K\left[\frac{\rho^2\beta\,\Delta t\,g\,C_p}{\mu k}\right]^{0.33}$$

TERMINOLOGY:

h_f - Film coefficient of heat transfer, BTU/hr.sq.ft.°F.
k - Thermal cond. of gas at t_f, BTU/hr. ft.^{2} °F./ft.
L - Height of vertical wall, ft.
ρ - Density of the gas at t_f, lb./cu. ft.
g - Acceleration of gravity. 4.17 x 10^8 ft./hr.^{2}
β - Coefficient of volumetric expansion of gas at t_f; for ideal gas is equal to 1/°R.
Δt - Temperature difference between wall and gas, °F.
μ - Viscosity of gas at t_f, lb./ft. hr.
C_p - Specific heat of gas at constant pressure, BTU/lb.°F.
t_f - Film temperature, assumed as arithmetic average of wall temperature and bulk gas temperature, °F.
Δt_s - Temperature difference, surface to surroundings.

LIMITATIONS: Equation applicable for values of the function.

$$\left[\frac{L^3\rho^2\beta\,\Delta t\,g}{\mu}\cdot\frac{C_p\mu}{k}\right]$$

over 10^9

This value will be exceeded in nearly every case in which vertical walls are over two feet in height.

SIMPLIFIED EQUATION:

Air - (wall over 3 ft. in height)

$$h_f = 0.27\,(\Delta t_s)^{0.25}$$

SOURCES OF DATA: For physical constants for use in above equation see Chemical Engineers' Handbook, J. H. Perry, (1948).

for ρ -- see pp. 130-148, 178-195, 1686.
μ -- see pp. 370-374, 1198, 1696.
β -- see p. 200-202.
k -- see pp. 459-461, 1303, 1697.
C -- see pp. 225-236, 297, 1686, 1696.

REFERENCES:

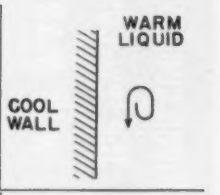
1. Introduction to Heat Transfer, Brown and Marco, pp. 111-115.
2. "The Basic Laws and Data of Heat Transmission," W. J. King, Mechanical Engineering, 57, 550, May '32.

See A 1 a (1) for others.

COEFFICIENT of HEAT TRANSFER through FILM between SURFACE of COOL VERTICAL WALL and WARM LIQUID

Liquid Movement: Natural Convection

Length of Wall: Short (Less than 0.15 ft.)



EQUATION:

$$h_f = 0.548\,\frac{k}{L}\left[\frac{L^3\rho^2\beta\Delta t g}{\mu^2}\cdot\frac{C_p\mu}{K}\right]^{\frac{1}{4}}$$

TERMINOLOGY:

h_f - Film coefficient of heat transfer, BTU/hr.sq.ft.°F.
k - Thermal conductivity of liquid at t_f, BTU/hr. sq. ft. °F./ft.
L - Height of vertical wall, ft.
ρ - Density of liquid at t_f, lb./cu. ft.
g - Acceleration of gravity. 4.17 x 10^8 ft./hr.^{2}
β - Coefficient of volumetric expansion of liquid at t_f.
Δt - Temperature difference between wall and liquid, °F.
μ - Viscosity of liquid at t_f, lb./ft. hr.
C_p - Specific heat of liquid at constant pressure in BTU/lb. °F.
t_f - Film temperature, assumed as arithmetic average of wall temperature and bulk liquid temperature, °F.

LIMITATIONS: Equation applicable for values of the function.

$$\left[\frac{L^3\rho^2\beta\Delta t g}{\mu^2}\cdot\frac{C_p\mu}{K}\right]$$

between 10^5 & 10^9.

For other values use graphical methods of reference 3 below.

For plate under 0.15 ft. in height.

SOURCES OF DATA:

For physical constants for use in above equation see Chemical Engineers' Handbook - J. H. Perry (1948).

for ρ -- see pp. 130-148, 178-195, 1683.
μ -- see pp. 370-374, 1198, 1696.
β -- see p. 200-202, 1678.
k -- see pp. 459-461, 1303, 1697.
C -- see pp. 225-236, 297, 1686, 1696.

REFERENCES:

1. Heat Transmission, William H. McAdams, pp. 237-251.
2. "Free Convection," W. J. King, Mechanical Engineering. 54, 347, (1932).
3. "Surface Heat Transmission," H. H. Heilman, Trans. Am. Soc. Mech. Engrs., FSP 51, 287-304, (1929).
4. Applied Heat Transmission, Herman J. Stoever, pp. 102-104.
5. "Studies in Heat Transmission," Colburn and Hougen, Industrial and Engineering Chemistry, 22, 522, (1930).

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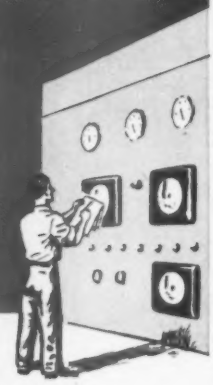

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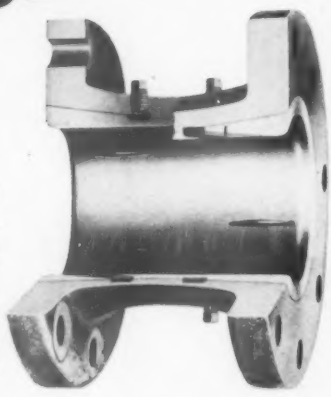

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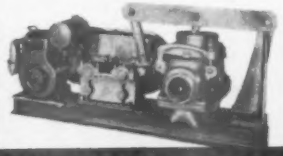

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by W. L. Nelson
Technical Editor

QUESTIONS ON TECHNOLOGY

This department was created for the purpose of aiding managers, superintendents, engineers, chemists, and all those engaged in various phases of plant operation, as well as those connected with the marketing and utilization of petroleum products. Readers are invited to submit their problems to W. L. Nelson, technical editor. Inquiries must be signed, but only the initials will be printed.

A.S.T.M.-T.B.P. Relationships

"How can we estimate true boiling points from A.S.T.M. distillation data of distillates or cycle stocks?" F. S. P.

Data on A.S.T.M. and true boiling points or ranges is not extensive. Petroleum Refinery Engineering, Third Edition, page 406, McGraw-Hill Book Co., Inc., New York, 1949, shows an approximate relationship for lower-boiling materials (gasoline and kerosine) and Schwarzenbek et al., "Factors Affecting Octane Numbers of Catalytically Cracked Gasolines," Third World Petroleum Congress, Section IV, page 166 (Appendix) shows something of these relationships for catalytic charge stocks. The two sets of data appear to be reasonably consistent and hence they might be considered as a general relationship that can be applied to the distillates or cycle stocks of the question. The general relationship is indicated in Tables 1 and 2.

TABLE 1
Relationships (Approximate) Between A.S.T.M. and T.B.P. Mid-Boiling Points

A.S.T.M. 50% B.P. (°F.)	T.B.P. 50% B.P. (°F.)
200	198
300	297
400	396
500	500
600	610
700	710

TABLE 2
Relationships (Approximate) Between A.S.T.M. and T.B.P. (20-80 Per Cent) Slopes

A.S.T.M. slope	T.B.P. slope
0.5	0.9
1.0	1.55
2.0	2.65
3.0	3.7
4.0	4.7
5.0	5.75
6.0	6.7
7.0	*7.9
8.0	*8.95
9.0	*10.0

*From other scattered data.

Example . . . Tables 1 and 2 may be used as follows:

A distillate material has a 50 per cent A.S.T.M. temperature of 570° F. By Table 1, the T.B.P. 50 per cent temperature should be about 577° F.

Its 80 per cent A.S.T.M. boiling point is 660° F. and its 20 per cent A.S.T.M. temperature is 480° F. This means a slope of 660 minus 480 divided by 60 (per cent), or 3.0° F. per per cent. According to Table 2, the T.B.P. slope will be about 3.7.

The estimated T.B.P. curve will pass through its midpoint of 577° F. and it will have a slope of 3.7°. As only one illustration, the 75 per cent T.B.P. temperature will be:

50 per cent temperature, °F.	570
(75 — 50) times 3.7	92
75 per cent temperature	662

S.A.E. Lube-Oil Classification

"I heard of a No. 5 lubricating oil. What is such an oil?"—F. C. T.

The No. 5 oil probably refers to the new 5W grade of S.A.E. (Society of Automotive Engineers) crankcase engine oil. According to the 1951 issue of the S.A.E. Handbook, there are now seven grades of crankcase oils and four grades of transmission and axle lubricants, as shown in Table 1 on this page.

The Society of Automotive Engineers specified in June 1911 and in 1923, 10 grades of crankcase oils including such tests as specific gravity, flash and fire tests, carbon residues, pour points, and viscosities, but such a broad specification became confusing as new types of crude oils and new refining methods appeared, and in 1926 a plain viscosity classification was adopted. During 1950 the S.A.E. 10, 60, and 70 grades were abandoned and the classification shown in Table 1 was adopted. However, additional information (in parentheses) besides the official S.A.E. Specification is included in Table 1 to assist in interpreting the meaning of the specifications. The unofficial value of viscosity given in Table 1 is based on a viscosity-index range of 36-110 which is thought to be representative of the full range of oils now being marketed, and the older classification for the S.A.E. 10, 60, and 70 grades is also included.

TABLE 1—S.A.E. VISCOSITY VALUES FOR CRANKCASE OILS AND TRANSMISSION AND AXLE LUBRICANTS (1950)
(Unofficial values are shown in parentheses)

S.A.E. viscosity No.	Viscosity range, Saybolt Universal, seconds, at Zero °F.	100° F.	130° F.	210° F.	Consistency must not channel in service at °F.
5W	**4,000 max.**				
10W	***6,000-12,000**	(97-205)	(61-110)	(38-48)	
(10)		(175-225)	(90-120)	(43-49)	
20W	**†12,000-48,000**	(125-490)	(70-225)	(39-66)	
20		(167-592)	(92-225)	**45-48**	
30		(359-974)	(172-350)	**58-70**	
40		(546-1,523)	(250-530)	**70-85**	
50		(790)	(345)	**85-110**	
(60)				(105-125)	
(70)				(125-150)	
80	**100,000 max.**				**—20**
90		**800-1,500**			0
140				**120-200**	35
250				**250 min.**	

*Minimum viscosity at 0° F. can be waived provided viscosity at 210° F. is not below 40 S.s.U. †Minimum viscosity at 0° F. can be waived provided viscosity at 210° F. is not below 45 S.s.U.

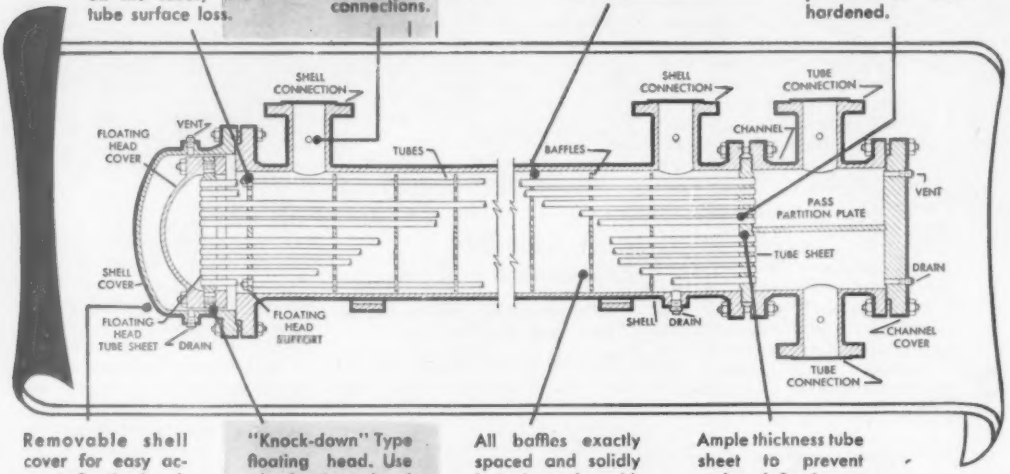
HEAT EXCHANGER EFFICIENCY starts with SUPERIOR DESIGN

"Do-Nut" shape support plate offers maximum support to the floating head without undue strain on the tubes, and tube surface loss.

Connection for pressure gauge and thermometer provided on all flanged connections.

Baffles — cross flow segmental type machine cut and drilled. Close tolerances assure maximum heat transfer.

Tubes — expanded into tube sheets by means of electronic controlled roller expanders, tubes cannot be over expanded or work hardened.



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"Knock-down" Type floating head. Use of floating head minimizes thermal expansion strains.

All baffles exactly spaced and solidly bolted together with heavy tie rods and spacers.

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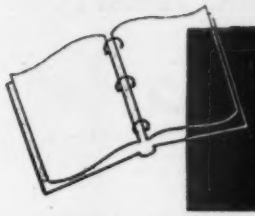


REFINER'S NOTEBOOK

BUTTERFLY VALVES . . .

What Are Some Factors in Sizing?—3

by C. A. Dally*

FROM the curve of "Opening" torque in Fig. 1, Installment 133, it is apparent that the torque required to operate the valve is not always of uniformly increasing or decreasing magnitude throughout the full travel of the valve, but may be erratic-decreasing in magnitude during a portion of the valve travel and then increasing over another portion. One also finds that within the portion of the valve travel from closed to approximately 35° open the direction in which the operating torque is applied must be reversed to change the direction of movement from opening to closing; whereas, at positions beyond 35° the operating torque is applied only in the opening direction.

Sizing the valve . . . It is quite obvious that the data required to determine the actual valve torque at all rates of flow for a given process are normally not readily available and would involve considerable engineering study to develop. But when they are available, they should be utilized to determine accurately the maximum operating torque and the opening at which it occurs so that the selection of valve design and motor unit can be based on this information.

Since this information is not available for most applications, it is common practice to base the valve and motor engineering on four factors which can usually be determined: (1) the maximum pressure differential across the valve when closed, (2) the maximum pressure differential across the valve at the closed position at such times that movement of the valve will be required, which may differ from the first condition, (3) the minimum flow to be controlled and the corresponding pressure drop that the valve must produce, and (4) the maximum flow and the corresponding pressure drop. By applying service and experience factors to this minimum service data, the maximum operating torque can be anticipated in the selection of equipment best suited for a given application.

Since both static torque and unbalanced torque are functions of the valve diameter, proper valve sizing is an important requisite to economy because of its effect on the size of the operating device. Fig. 1 on this page illustrates the relation between the torques required to operate a 14-in. and a 10-in. valve under the same service conditions, i.e., with equal flows at equal pressure drops. As illustrated, when closed against the same pressure differential, a 14-in. valve will require a motor with 2.15 times the torque capacity of that required by a 10-in. valve. To pass 20 per cent of a given maximum flow with equal pressure drops, a 14-in. valve must be open only 18° as compared to 30° for a 10-in. valve; however, its operating torque is shown to be 1.74 times that of the 10-in. Likewise, at 100 per cent of flow a 14-in. valve requires 1.32 times the operating torque of a 10-in. valve, although its disk need be only 48° open as compared to 60° for the 10-in. Thus, regardless of the fact that the required angular opening is less in a large valve than in a small one for equal capacities, the curve shows that the size of the operating device is materially affected by valve size. The use of a particular type of motor, that might be used if the valve were correctly sized, may even be precluded by incorrect valve sizing.

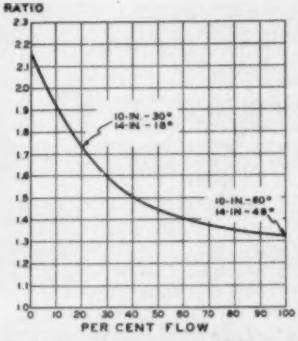


Fig. 1—Operating torque ratio, 14-in. versus 10-in. butterfly valves (equal capacities).

Methods of Operation

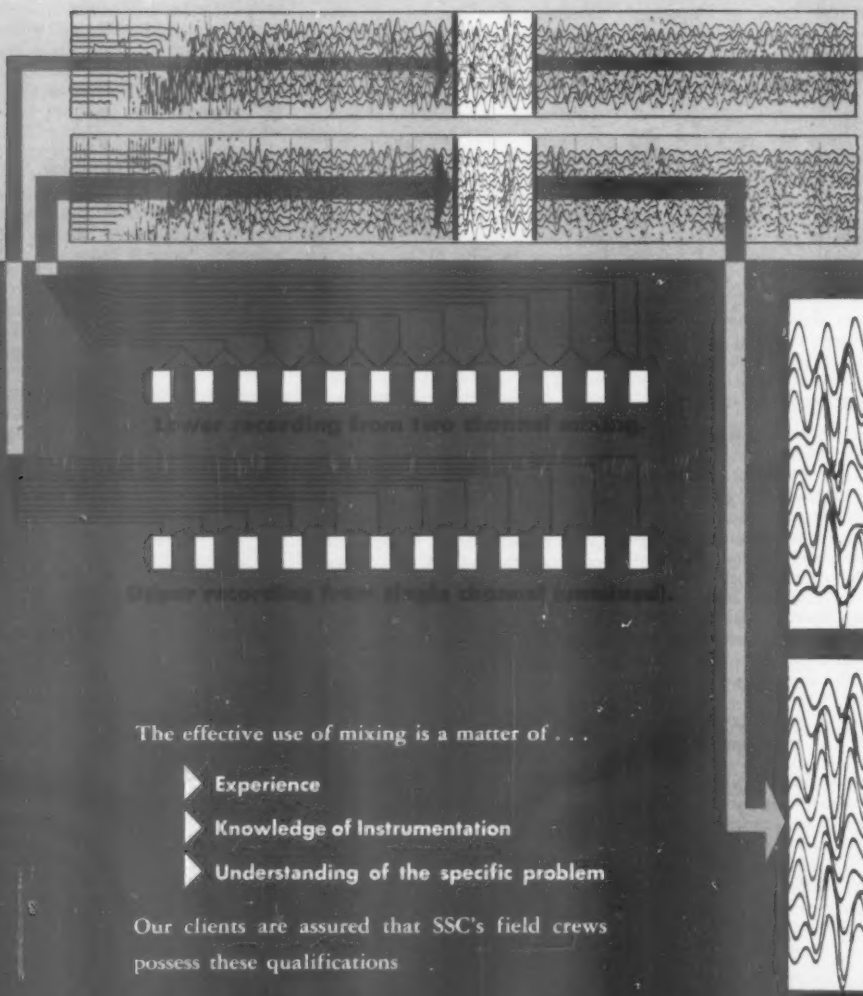
Any of the numerous types of diaphragm, cylinder, or electric drives available may be used to actuate a butterfly valve.

Diaphragm-motor operated . . . Rather than standardize on one motor size for a given valve size, the most economical size motor is used that will satisfactorily operate the valve under the service conditions for each specific application. However, frequently the magnitude of the required operating torque precludes the use of a particular make of drive or even the use of a general type of motor. For example, the use of a spring type diaphragm motor is often denied on larger valves operating under high differentials because the spring cannot be sufficiently precompressed to cause the valve to fail to open or to close as required. If a springless type motor or a cylinder operator is required to get sufficient operating torque on an application for which a spring type motor was initially specified, then the valve action in the event of operating medium failure may be of some concern. The curves in Fig. 1, Installment No. 132 (August 4, 1952), and Fig. 1, Installment No. 133 (August 11, 1952), indicate that if the valve is opened to an angle greater than 30° at the time of such a failure, it would close to 30° under its own action and remain there. It is, therefore, often desirable with such devices to provide a lock that will hold the valve in its last position or to provide a reserve pressure source with sufficient capacity to stroke the valve to the desired position.

*Continental Equipment Co., Coraopolis, Pa. From paper presented at seventh annual process instrumentation symposium at Texas A. & M. College, 1952.

Basic Methods of Improving Seismic Records . . .

The Effect of MIXING



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How to Maintain Oil-Field Chains—1

by Dave Breith*

FROM the time a drilling rig, rotary or cable tool, arrives at the first location where it will be set up, or onto a supply store's display yard, or contractor's yard, the elements that will surround it during the entire lifetime of the equipment start taking their toll.

Dust blows into and onto all exposed parts, and insidiously makes its way into almost airtight chain cases, bearings, etc.

Lubrication important . . . When the rig starts operation, practically all of the equipment, excluding the engines, is almost completely exposed to the elements.

It should be remembered that an occasional cleaning of the oil sump, of the oil-bathed chain cases, compound cases between the engines, and other depositories of oil for and from the chain are as important to the drilling contractor as checking the alignment of the derrick, pump, or other equipment. One of the musts for chain lubrication is that a good grade of clean oil must be used. Crankcase drainings are harmful to the chain and should not be used.

*Chain Belt Co., Milwaukee.

How to Lubricate

Some think of lubrication as: "putting oil on it." That can be false lubrication, putting oil on it, does not always result in getting oil into it.

Wherever metal bears on metal, forming a bearing surface, friction starts to rob. It robs power, efficiency, and it robs the life of the bearing.

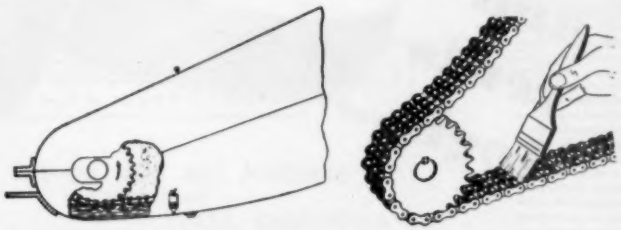
Every piece of chain is made up of a series of bearings. Every link, or pitch, has bearing surfaces between roller and bushing, and between bushing and the pin. It is vital to good chain life that this be an important consideration of chain maintenance. With this in mind, lubrication becomes a major factor in chain life, as it does to any other type of bearing. It is necessary to get oil into the bearing to form a protective film between the metal surfaces, thus reducing friction.

There are various ways to obtain proper chain lubrication. First, the variable factors leading to the selection of a proper lubrication method best suited to the particular drive or drives must be considered.

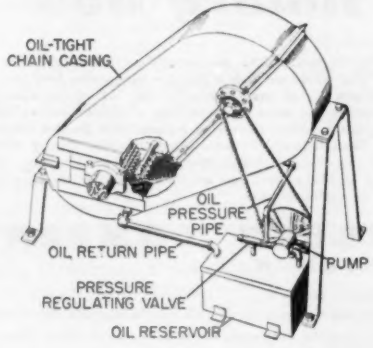
Rotary table . . . Can an oiltight, oil-bath chain case be installed on the rotary table, and if so, will it be practical? The contractor, his superintendent, and the tool pusher on the rig must decide this point; if the rig is operating in an area where there is only shallow drilling, where time on each location is very short, and the rig is intended to remain in that area during its operating life, an oil-bath chain case might be impractical.

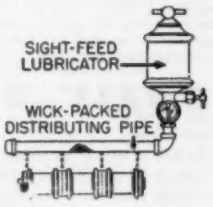
If the speed of the rotary table is constantly low, the use of an oil-bath case might not be justified.

If, however, the speed of the rotary table is high, or if a deep hole is to be drilled, an oil-bath chain case is usually justified. Faster operation with less required maintenance results.



CORRECT LUBRICATION makes chain drives last longer. Bath lubrication, left. Manual lubrication, right.





Forced feed, left, is used for high-speed, heavy-duty work. Drip feed, below, is often satisfactory. Courtesy Chain Belt Co.

dollars and cents logic...

about GOODALL Rotary Hose...

When you buy your first length of Goodall Long-Life Rotary Hose, you establish a maintenance program just as you do with other salvable equipment. You would not junk a two thousand dollar field car, for example, just because it had a flat tire and was out of use temporarily. You would not discard a drawworks just because the brake needed relining. Yet some operators buy a fifteen hundred dollar rotary hose and are forced to junk it the first time it suffers a break or rupture. With Goodall Long-Life Rotary Hose, your investment is protected by Goodall's exclusive maintenance. Goodall factory maintenance means extra long life and thousands of extra feet of drilling. No length of Long-Life Hose which has been repaired in our shop has ever failed in service. Why buy any other hose that does not give you this extra protection, extra long life — at no additional cost.

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OIL AND GAS EQUIPMENT Digest

IT'S NEW CHECK IT

TRADE LITERATURE

1 PIPE-LINE TRENCHLINER for mile-a-day cross-country trench production is described in new four-page bulletin. Designated as Model 215 trenchliner, this new wheel-type unit digs in a range of 30 digging feeds, from 6.2 in. to 18½ ft. per minute, 13 to 31 in. wide, and up to 6 ft. deep, and equipped with standard tractor crawlers and self-cleaning lug-type shoes. Actual field photographs are included. *Parsons Co.*

2 ARMSTRONG STEAM TRAP BOOK is a 44-page catalog which includes a trap catalog section containing complete physical data and list prices on cast semisteel and forged-steel inverted bucket steam traps, compound steam traps and ball float air and air relief traps, and a maintenance section. It is well illustrated with installation diagrams and cutaway and cross-sectional views. *Armstrong Machine Works.*

3 INSTRUMENTS ACCELERATE RESEARCH is a reissue of Bulletin 15-14 which has been augmented to include many items not covered in previous editions and brought up to date to include latest designs of various analytical equipment. Bulletin comprises 96 pages and has complete illustrations with pictures of latest instrument and equipment in laboratory, analytical, and measurement fields. *Minneapolis-Honeywell Regulator Co.*

4 ALL-STEEL ROTARY HOSE. Illustrated bulletin describes new all-steel rotary hose designed specifically for portable rigs. It contains photographs, descriptive data, and actual engineering drawings of each unit. *Chiksan Co.*

5 NEW AUTOMATIC CONTROLS SYSTEM bulletin describes automatic control systems for Rockwell's '015' high-pressure balance valve regulators, ranging in size from 2 to 12 in. Bulletin is designed to facilitate selection of proper-sized regulator and best form of control to meet specific gas pressure regulation needs. Over 35 photographs, dimensional drawings, cutaway views, and sectional drawings illustrate available control systems, assemblies, and operation. *Rockwell Manufacturing Co.*

6 COOLING TOWERS is a new illustrated, 36-page catalog which contains details of construction, charts, suggestions on recirculation, and surroundings. It also includes "Inquiry Data Sheet" for planning requirements. *Foster Wheeler Corp.*

7 MUD FOLDER. A four-page folder compares two identical wells in Tejon field, California, one completed with water-base mud, and the other with Black Magic oil-base drilling fluid. Completion data and production figures are furnished in detail with an explanation of how substantial savings in mud costs can be realized and increased production obtained. *Oil Base, Inc.*

8 BS&B CLIMAX SECTION 110 is a revised edition of Pilots and Controllers Section of BS&B Climax

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OIL AND GAS EQUIPMENT Digest CHECK IT

Control Equipment catalog. Section shows complete lines of BS&B Climax time cycle, pressure, and manual remote controllers, vacuum pilots, and safety shutoff pilots. It is fully illustrated with sectional drawings and photographs. *Black, Sivalls & Bryson, Inc.*

9 AUTOMATIC FIRE CHECKS, SAFETY BLOWOUTS, two protective devices used in piping systems of gas-and-air combustion systems, are described in new 12-page bulletin. Dimensional drawings, piping diagrams, and pressure-loss charts are shown. *Selas Corp. of America.*

10 STEEL BUILDINGS AND FRAME WORK FOR OIL-INDUSTRY STRUCTURES. Brochure is offered giving details of the "Arcon" structure for both housing and steel buildings suitable for use in all petroleum operations. *Taylor Woodrow (Building Exports), Ltd.*

11 INSTRUMENTATION DATA SHEET NO. 7.0-4 describes Shand & Jurs method of supplying an accurate record of mud circulation in oil-well drilling operations, and also explains operation as used with Brown recorders. Illustrations of various components of equipment are included. *Minneapolis-Honeywell Regulator Co.*

12 BULLETIN NO. 47-A is devoted to Type 2-B, single-inlet, and Type 2-BB, double-inlet squirrel-cage blower-type cooling towers. Other data includes chart showing typical temperature performance data, complete tower specifications, and nine advantages for Type 2-B and 2-BB Series. *Binks Manufacturing Co.*

13 LOOK AHEAD WITH GM TUBING. Brochure discusses manufacture of single and double-wall tubing, Fuse-Kote finish, and bending and forming process. Fabricating operations and tubing specifications are featured. *Rochester Products Div., General Motors Corp.*

14 DRILLING SPECIALTIES. A 12-page graphically illustrated catalog describes a complete line of drilling specialties, including telescoping pole masts, mud conveyors, utility houses, and numerous other drilling requirements. *S & R Tool Co.*

15 DIRECTIONAL DRILLING. New eight-page descriptive brochure contains information on tools for directional drilling, and illustrates operation methods of deflecting tools. *Universal Oil Tools Co.*

16 WATER FILTERS is a nine-page multicolored bulletin on pressure-type filters for removal of visible suspended matter from water. It describes details of design and construction, built in both vertical and horizontal types, together with all accessory equipment which is furnished to help promote maximum efficiency. *Graver Water Conditioning Co.*

17 CAUSTIC SODA. Revised booklet specifically deals with manufacture of caustic soda, chemical and physical properties, methods of handling and storing, technical data, methods of analysis, and first-aid treatment for caustic burns. *The Dow Chemical Co.*

18 BULLETIN T/C 9 is a data book and catalog which contains prices, application recommendations, and pertinent information concerning instrument sensing units and associated accessories. Also contains essential data pertaining to making, checking, selecting and ordering thermocouples, wire sizes, and resistances and temperature-millivolt curves. *Wheelco Instruments Div., Barber-Colman Co.*

19 ELLIOTT INDUCTION MOTOR is a four-page illustrated bulletin describing complete line of outdoor splashproof (weather-protected) fabristeel induction motors ranging in size from 250-4,000 hp., 2 poles; 50-3,000 hp., 4 to 14 poles. *Elliott Co.*

20 CATALOG NO. 52 contains complete presentation of Bunting products and services. New sizes have been added to lists of bronze bearings and precision bronze bars. There are 854 different sizes of standard stock bearings from 3/16 to 4½-in. i.d. with a range of outside diameters to meet practically all production and service needs of modern industrial machinery. *The Bunting Brass & Bronze Co.*

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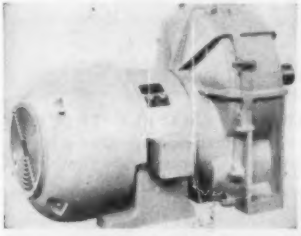
OIL AND GAS EQUIPMENT Digest

IT'S NEW CHECK IT

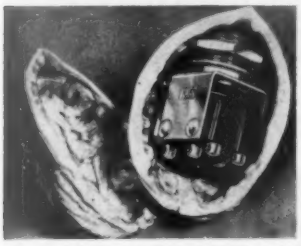
by Dan B. Miller

21 NEW GEARED ELECTRIC DRIVE with double reduction gears is a large, totally enclosed, fan-cooled, geared motor. This new unit is double reduction and available with class I, II, and III gears in frame size 364/365, and A.G.M.A. speed 155 r.p.m. and slower in ratings from 5 to 25 hp. In this drive bearings are mounted in the outer walls of the gear case and gears are mounted between these widely spaced bearings, permitting use of offset shafts and providing permanent bearings and gear alignment in uniform distribution of load. Corrosion-resisting gray-iron housing; labyrinth seals; large, safe terminal boxes; and rugged helical gears make this geared motor well suited for low-speed drives. *Sterling Electric Motors, Inc.*



IT'S NEW CHECK IT

22 NEW WEATHERPROOF SWITCH. A new compact, weather and oilproof push-button electric switch weighs only 1 oz. The double-pole, double-throw assembly is so small it will fit inside a walnut shell. The panel-mounted push button is sealed against the entrance of oil, water, and dirt by synthetic sponge rubber. The small movement required to operate subminiature snap-acting switches is provided by resilience of the seal. No sliding joints are required. Underwriters' Laboratories list both single and double-pole switch assemblies for 5-amp. 250-volts a.c., and either type will control 30 volts d.c. inductive loads of 2 amp. at sea level, and 1½ amp. at 50,000 ft. elevation. Installation and wiring of the new switch are accomplished easily by snap removal and replacement of switch elements in mounting brackets. *Minneapolis-Honeywell Regulator Co.*

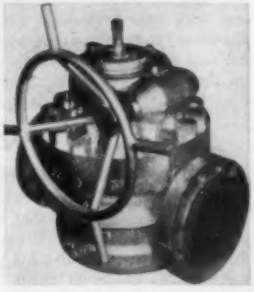


IT'S NEW CHECK IT

23 LM-8 IN. 15,000 G. P. M. METER is the first meter of this capacity equipped with a temperature compensating device. The illustration shows the LM-8 in. meter complete with temperature compensating control and ticket-printing counter. These meters incorporate the exclusive Granco rotary positive-displacement principle. This featherweight rotary motion embodies all the advantages that assure the accurate and dependable metering of petroleum products, minimum-slippage area, sustained motion, low-pressure loss, directional flow, no reciprocation, and maximum driving power. *Granberg Corp.*

IT'S NEW CHECK IT

24 CONE-DRIVE DOUBLE ENVELOPING worm gearing is used on many of A. C. F. larger-size lubricated valves, both in semisteel and in carbon steel. The gears are enclosed in a specially designed sealed housing that is filled with lubricant. These gears are standard on the ACF 400-lb. class, carbon-steel valves with full round opening ports in sizes 4, 6, and 8 in. They are also used on many other types of larger valves in semisteel and carbon steel where enclosed gearing is required. *American Car & Foundry Co.*



The Oil and Gas Equipment Digest presents a review of what is new in equipment and trade literature . . . makes it possible for readers to obtain full information on every subject by use of convenient "Check It—Mail It" service card. This periodic feature of The Oil and Gas Journal will include all that is new in equipment . . . at a time when new products are being introduced, and existing products improved.

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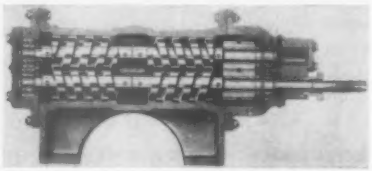
25 NEW LP-GAS (PROPANE - BUTANE) ENGINES are optional on all International truck models equipped with the heavy-duty Super Red Diamond en-

gines. The new LP-gas-powered models include the LP-185, LP-195, and LP-205 Roadliner tractor-trucks, and all other models in the L-185 through LF-210 series. Large fuel tanks, standard on International's LP-gas-powered units, permit trucks to run as far as 400 miles between refuelings. The high-octane qualities of LP-gas make use of higher compression ratios possible on the three LP-gas adapted Super Red Diamond engines, the "372," the "406," and the "450." *International Harvester Co.*

IT'S NEW CHECK IT

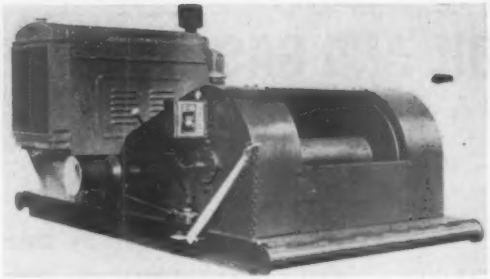
26 INTERNAL GEAR - AND - BEARING - TYPE SCREW PUMP is for positive displacement of lubricating fluids or semifluids. Capacities range from 1 to 700 g.p.m., and discharge pressures are 1,000 psi. for vis-



cous liquids, and 500 psi. for light oils. Special points of interest in the new pump are: the heavy-duty roller bearings just inboard of the timing gears where radial load is heaviest; lock nuts behind the timing gears for faster, simpler repairing; and double-row angular contact ball bearings at the rear end which position the rotors axially for less wear on the bearings and timing gears. *Sier-Bath Gear & Pump Co., Inc.*

IT'S NEW CHECK IT

27 IDEAL TYPE T-8 HOIST will normally be considered for servicing jobs in the 2,000 to 4,000-ft. depth range. However, an optional rotary-drill attachment adapts it for drilling in the 1,000 to 2,000-ft. range. Designed for 80 input horsepower, the T-8 incorporates many of the features found in larger Ideal rigs. It can be powered by either a torque-converter-equipped engine or by an engine equipped with an automotive-type four-speed transmission. The engine throttle and clutch controls are air operated. The arrangement and design of the unit make it suitable for truck mounting. By removing the two catheads, the overall rig width is under 8 ft. The main drum is of the free-spooling type mounted on roller bearings. A Fawick Airflex clutch is used for the main drum drive. This air-operated clutch is an external contracting clutch which engages a



rim bolted to the drum flange. Ideal modified Type K equalizing brakes and replaceable brake rims are used on the hoisting drum. The optional rotary drive, actuated by a Fawick Airflex clutch, is mounted on the end of the drum shaft. All controls are convenient to the driller's position. *The National Supply Co.*

IT'S NEW CHECK IT

28 CIRCULAR SAW FOR GRAVELY TRACTOR. A new power saw drive that mounts either a heavy-duty chain saw or a circular saw is completely flexible for

ground-clearing purposes. The chain saw fells and cuts up the big timber, then a quick change to the circular saw and the smaller scrub trees and brush can be cleared away quickly and easily. The operator is always in a comfortable standing position while operating the equipment. The chain saw mounts directly on the front of the tractor, is quickly adjustable to cut any angle horizontally or vertically. The power unit is the sturdy Gravely tractor. The bar of the standard unit is 24 in. in cutting length, but longer bars are available on special order. Blade diameter of the circular saw is 26 in. *Gravely Motor Plow & Cultivator Co.*

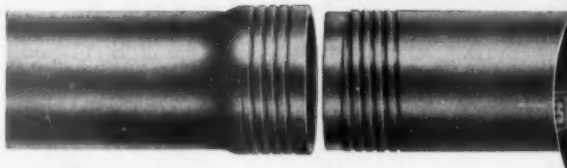
IT'S NEW CHECK IT

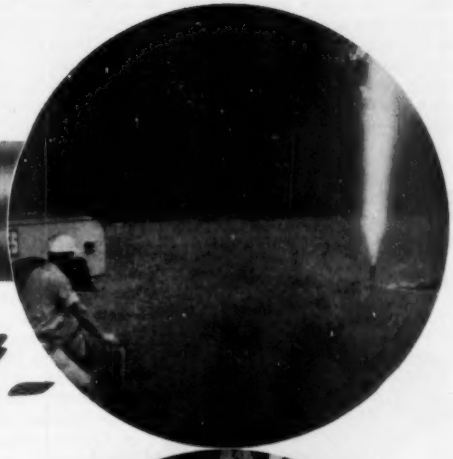
29 WEIGH-O-MATIC LIQUID METER weighs liquids continuously in small batches and totals the number of these batches on a mechanical counter. The unit consists of a bucket divided into two equal compartments that is mounted on a shaft and two self-aligning lubricated ball bearings. The bucket oscillates from one side to the other so that one compartment is in an upward po-

J&L STEEL

SHOT HOLE CASING

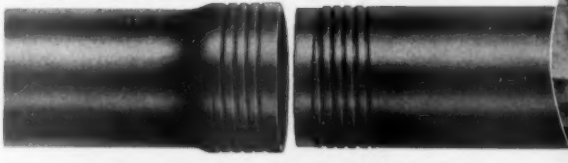
USE IT OVER
AND OVER
AND OVER





Just shoot it—

and pull it—



AVERAGE PULL-OUT
STRENGTH - 15000 #

AMERICA NEEDS SCRAP TO MAKE MORE STEEL

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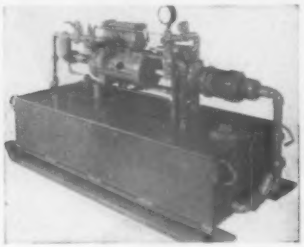
J&L STEEL
Subsidiary of
Jones & Laughlin
Steel Corporation

sition and the other downward. Liquid flows through an inlet pipe into the upward compartment and when it becomes filled with a certain weight, the compartment overbalances and the liquid is discharged. The equipment can be used for measuring crude oil, salt water, fresh water in water-flood operations, muds and slurries, corrosive liquids, liquids containing solids that cannot be measured by other means, powders such as cement. *Oil Metering & Processing Equipment Corp.*

IT'S NEW CHECK IT

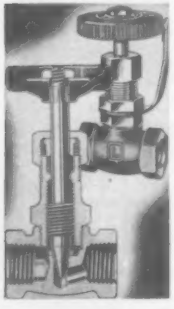
30 COMPLETE LINE OF RAM SERIES PUMPS, designed exclusively to operate hydraulic blowout preventers, and manufactured in some 25 types of standard units, are two-stage, double-acting, simplex units which operate on air, gas, or steam. They are furnished in either RAM 5,000 or 10,000 series with various standard sizes of fluid cylinders and boosters for a wide range of volumes and pressures.



The pump is composed of a power cylinder; a low-pressure, large-volume pump; a high-pressure, small-volume pump; and an automatic unloading valve. When the air, gas, or steam pressure is admitted to the power cylinders, both fluid end and booster begin to operate and the fluid from both is manifolded into a common discharge. When the fluid pressure is built up to six times the air, gas, or steam pressure, the automatic unloading valve snaps open, and dumps the fluid discharge of the fluid end back to the fluid reservoir. After the unloading valve opens, there is no pressure on the fluid end and this leaves the booster free to produce pressures up to 90 times the air, gas, or steam pressure. *Payne Manufacturing Co.*

IT'S NEW CHECK IT

31 NEW GLAND-TYPE BRONZE NEEDLE VALVE is small and compact, making it ideal for use in pin-point control on small lines where fine regulation of flow is essential. It is manufactured in a full range of sizes from ⅛ to 1-in. and in both globe and angle patterns. The handwheel is of non-slip design, which lends itself to delicate finger-tip control. The new control valve is also being produced in an indicator model available in ¼, ⅜, and ½-in. sizes. The handwheel on the indicator needle valve is of cast bronze and has numbered graduations indicated on its face, permitting resetting to a predetermined degree of opening. A spring clip engaging serrations on the outside of the wheel holds the valve securely at its proper setting. *Lunkenheimer Co.*



32 HUCK BLIND LOCKBOLTS accomplished repairs in only 9 hours, where conventional methods would have required 668 hours on one overhaul job. Blind Lockbolts are installed by one person from outside the tank thus eliminating the need of draining, cleaning out, flushing, and ventilating the interior. A heat-treated, alloy-steel, blind fastener with a positive swaged lock, the lockbolt has exceptional strength and pull-together. This fastener is particularly applicable where rivets do not possess sufficient strength. Available in ¼ and 5/16-in. diameters. For the ¼-in. size, shear strength is 4,990 lb. and tensile strength is 1,760 lb. For the 5/16-in. size shear strength is 8,190 lb. and tensile strength is 3,275 lb. *Huck Manufacturing Co.*

IT'S NEW CHECK IT

33 DYNEL FABRIC. A new line of dynel industrial clothing in subdued color patterns, claimed to outlast most similar garments, is made from a newly developed fabric known as Chem-Weave, which employs special weaving and processing of dynel yarns. The result is stronger, lighter-weight industrial garments. This fabric tests considerably stronger than cotton and is among the strongest of existing synthetics. Chem-Weave shows exceptional resistance to chemicals. In immersion tests with 59 commonly used industrial chemicals, the dynel fabric proved highly resistant with minimal loss in tensile strength, even in high concentrations and at temperatures up to a boil. Neither color nor fabric strength was affected in one test where Chem-Weave was immersed in 70 per cent sulfuric acid at 50° C. for 20 hours. *Chem-Wear, Inc.*

IT'S NEW CHECK IT

34 INJECTION NOZZLE PULLER is for removing the fuel-injection nozzle from the cylinder head on all International Harvester diesel engines. This tool is fast and efficient, exerts a straight, powerful pull, and does the job in minutes where it used to take hours. The tool is adjustable and may be used for other pulling jobs as well. *Owatonna Tool Co.*

IT'S NEW CHECK IT

35 NEW WATER BATHS feature polished 18-8 stainless steel interiors and exteriors. Special thermostat gives complete range from room to 100° C.; sensitivity and uniformity better than ½° at any point to 100° C. A special feature is a heat diffuser plate which eliminates hot spots and assures even temperature. It has efficient 1-in. insulation and large water capacity. *Labline, Inc.*

Pumps

. . . . FOR THE OIL INDUSTRY

Two C.M.C. Dual Prime Model 420 Pumps loading lub-oil for Mid-Continent Petroleum Corporation at Odessa, Texas.

Exclusive twin jet design advantages give C.M.C. Dual Prime Pumps longer life, minimum maintenance and outstanding operating performance.

They are simple, rugged, fool-proof—and every pump is tested under most severe conditions.

Automatic priming speed on lifts up to 25' is unmatched. Sizes 1½" to 10"—3,000 to 240,000 G.P.H.

Write today for full details—our qualified engineers will gladly help solve your pump problems.

CONSTRUCTION MACHINERY COMPANIES
WATERLOO, IOWA

JENSENS—cut costs!

We've said it before and we'll say it again—"any well is likely to be more profitable and less trouble if equipped with a JENSEN Pumping Unit!"

This is no idle statement, it is a fact, proven by years of production records. And there's a good, sound reason behind it. JENSEN Units are simple, practical, economical units—backed by 33 years know-how.

Get the facts, and we believe that you'll get Jensen.

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BROS. MFG. CO., INC., Coffeyville, Kansas
EXPORT OFFICE: 50 Church St., New York City

BRONZE, IRON, and STEEL PUMP LINERS

We carry a very complete stock of pump liners for pumps commonly used in refinery and oil field service. These are accurately machined to fit the pumps for which they are made. These are carried in regular sizes while a considerable quantity of reducing liners are also carried. These liners can be furnished from bronze, iron, mild steel and hardened and ground alloy steel. They can also be made from stainless and other metals promptly. Our liner prices are well in line with factory prices.

L-K
Pump Valve Co.

P. O. Box 901 **HOUSTON 1, TEXAS**

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FLOW LINE VALVES

Here's What Happened!

The above high pressure gas well in western Pennsylvania was equipped with a 10,000 p.s.i. test KEROTEST cross type master valve and matching Kerotest Flow Line Valves. The well was shot and cleaned through these valves and the well closed off at over 4000 pounds pressure without a leak. A water seal poured on the top valve showed not a bubble! This well is flowing 50,000,000 cu. ft. of gas daily with a back pressure of 2300 lbs. sq. in.

Here's why this KEROTEST Flow-Line Valve is justly famous—

- **It has positive operation—high safety factors.**
- **Long-wearing—hard faced wedges.**
- **Full opening clearway bore.**
- **Safe—extra heavy walls, high tensile bolting, extra deep stuffing box.**

KEROTEST MANUFACTURING COMPANY
PITTSBURGH 22, PA.

NATURAL GAS

June Gas Sales Up

Total sales of natural gas to ultimate consumers in June were 3,039 million therms, according to the American Gas Association.

The total represented an increase of 0.7 per cent from sales of 3,019 million therms in June 1951.

The A.G.A. said its June index of natural-gas sales was 343.9 per cent of the 1935-39 average. For the year ended June 30, sales of natural gas totaled 46,245 million therms, a gain of 9.6 per cent over the previous 12-month period.

By comparison, combined sales of manufactured and mixed gases during June totaled only 231.1 million therms, a decline of 2.9 per cent from the same month in 1951. The index of manufactured and mixed gas sales for June was 140.8 per cent of the 1935-39 average.

Gas Use Sets Record

WASHINGTON. — Electric - utility power plants consumed 89,289 million cubic feet of gas in June, the highest monthly gas use on record and a gain of 1.9 per cent from the previous record of August 1951, according to the Federal Power Commission.

Consumption of coal during the month was 4.4 per cent below that of May and 5 per cent below that of June 1951. Fuel-oil consumption in June totaled 3,912,228 bbl. 13.9 per cent under the same month a year earlier.

A.G.A. Names Committee

NEW YORK.—W. Lee Woodward, president of Senith Gas Co., Inc., Alva, Okla., has been named chairman of a new committee of the American Gas Association on special problems of small gas companies.

The committee was named to look after the interests of the smaller companies in A.G.A. activities.

First meeting of the committee was scheduled to take up training schools for service men, sales and promotion, insurance, and public relations.

Natural Gasoline

L.P.G. Sales Up

Propane now accounts for 57 per cent of total sales

SALES of liquefied petroleum gas increased 21.4 per cent in 1951 to a total of 4.2 billion gallons, according to the annual survey of the Bureau of Mines.

The growth in L.P.G. production through greater recovery of propane is shown by the percentages of total sales represented by the products. Propane, sold as such, increased from 32.3 per cent of total sales in 1946 to 57.2 per cent in 1951.

Butane sales increased 61 per cent between 1946 and 1951, and yet, butane sales represented only 16.8 per cent of the total in 1951 compared with 25.9 per cent in 1946.

Sales of L.P.G. as fuel for internal combustion engines now account for 6.8 per cent of total deliveries. The report calls attention to the fact that sales listed under this classification for 1951 are not comparable with totals of other years.

The report for 1951 is based on more detailed information from a larger number of dealers, giving a better classification of end use. The lack of end-use data in prior years resulted in the listing of some of the internal-combustion-engine fuel under domestic consumption.

Use of L.P.G. in chemical manufacturing gained 35 per cent in 1951 to account for 20 per cent of total sales, compared with 18 per cent in 1950.

The report for 1951 gives a complete breakdown of sales by end use. Under these divisions sales are further broken down by states for both 1951 and 1950.

Total sales for 1950 and 1951 by PAD districts are shown in the accompanying table.

SALES OF L.P.G. IN UNITED STATES

(Millions of gallons)

	1951	1950	Per cent increase
District 1	785.9	754.6	4.1
District 2	1,165.2	1,030.8	13.0
District 3	1,788.1	1,322.0	35.3
District 4	92.4	74.7	23.7
District 5	395.7	300.5	31.7
Total U. S.	4,227.3	3,482.6	21.4

Grounds Keepers' Assistants

Assistants to the grounds personnel at Trinity Gas Corp.'s cycling plant in Sejite field, Duval County, Texas, are these two deer, Fannie and Pancho. J. O. Jones, plant superintendent, is shown paying them off in cigarettes—their favorite medium of exchange.

Underground Storage Planned

AUSTIN.—Cities Service Oil Co. has asked the Texas Railroad Commission to approve a proposed underground-storage project for liquefied petroleum gas in Panhandle field of Gray County.

The proposed cavern, to be leached out of a salt section at about 1,050 ft., would have a capacity of 25,000 bbl. initially. Cities Service asked, however, that it be given permission to increase its size later to 100,000 bbl. and that it be given the authority further to create other cavities if the need should arise.

Brine from the washing process would be stored in a surface pit. The company said that if the salt section at 1,050 ft. should prove unsatisfactory, it expected to wash out a cavern in another section at about 1,750 ft.

DESCO Mobile Valve Lubrication Service

PAYS BIG DIVIDENDS

when you consider that your valves last 3 to 5 times longer

SAVE MAN-HOURS. When a trained Desco crew with a Desco mobile unit moves on your property they are fully equipped to properly lubricate and adjust any lubricated valve in minutes, where usual methods take hours or sometime days.

SAVE VALVES. By having DESCO Units service your valves at proper intervals, with positive lubrication, proper adjustment and the right lubricant, you can expect your valves to last 3 to 5 times longer.

YOU CAN EASILY PROFIT by using Desco's mobile service for refineries, gasoline plants, pipe lines, tank batteries, gathering lines and xmas trees—because we know we can lubricate and adjust your valves *cheaper* and BETTER than you can!

MAKE US PROVE IT! A letter will bring facts and figures that will convince you—and there's no obligation!

DESCO Service Co.

804 Louisiana Ave. • Phone 5-2416
SHREVEPORT, LOUISIANA, U.S.A.

REFINING

Newark Refinery Considered

Paragon Oil Corp. has indicated it plans to build a 2,000-bbl. refinery at Newark, N. J.

The Defense Production Administration in Washington approved certificates of necessity to Paragon Refining Corp. authorizing rapid tax amortization for $3,119,765 at 95 per cent, $14,299,744 at 65 per cent, $7,417,000 at 40 per cent, and $930,000 at 15 per cent.

Full cost of the plant was thus estimated at $25,766,509. The 65 per cent writeoff item was for crude processing facilities; the 95 per cent on alkylation equipment; the 40 per cent on storage, while the remaining $930,000 covered other facilities. Catalytic-cracking equipment also is to be included at the new refinery.

Paragon Oil is a major marketer of fuel oils and gasoline in the greater New York harbor area.

Insecticide Plants Under Way

BATON ROUGE.—Ethyl Corp. has two projects under way which will increase the production and variety of insecticides manufactured here.

Greatly enlarged facilities for the production of benzene hexachloride are nearing completion, and a large lindane plant is scheduled for completion early next year.

While BHC serves as an insecticide in its own right, it will also serve as a base material for lindane production. The lindane consists of a 99 per cent or higher concentration of the gamma isomer of BHC.

Benzene hexachloride is manufactured by combining benzene and chlorine in the presence of light. The light serves as a catalyst to obtain the desired type of reaction.

The material resulting from the combination is composed of at least five isomers of BHC—alpha, beta, gamma, delta, and epsilon. The gamma isomer is the active component which has the insecticidal properties.

Refiners Pay $475,400,000 In First-Half Dividends

WASHINGTON.—Oil-refining corporations paid out $475,400,000 in dividends during the first half of 1952.

No other industry's dividends were within reaching distance of this total, it is disclosed by figures compiled by the Department of Commerce.

The 1952 disbursements were about 20 per cent greater than the $396,000,000 distributed in the first 6 months of 1951.

Dividend payments for the month of June alone showed an increase of 11 per cent over last year—$214,000,000 against 192,200,000, the department reported.

Oil Taxes Show Big Gain

WASHINGTON.—Treasury revenues from the four federal oil taxes in the fiscal year ended June 30 ran $151,000,000 ahead of those of the preceding 12 months.

Most of the gain, according to Internal Revenue Bureau figures, was from the gasoline tax, which returned $713,174,163 for the year, an increase of $144,126,202 over 1951. Receipts from pipe-line transportation of oil increased $1,935,202 to $26,881,146, and the new tax on diesel oil returned $7,137,799. The only item to show a loss was lubricating oils, from which $95,286,094 was secured, a drop of $1,952,002 from the preceding year.

The greater part of the increase fell in the first 6 months of this year, reflecting the increase in the gasoline tax imposed by Congress late in 1951.

An increase of nearly $125,000,000 in collections over that period resulted from receipts of $377,647,876 from gasoline, against $270,229,462 in the first half of 1951; $53,755,231 from lubricating oils against $44,570,478; $14,955,826 from pipe-line transportation against $13,893,669, and $7,137,799 from diesel oil.

Infrared File Being Formed

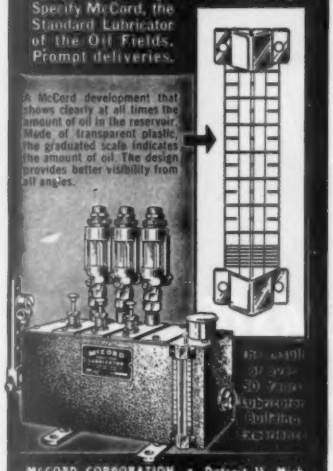
WASHINGTON.—A comprehensive punch-card catalog of all available data on the infrared spectra of organic and inorganic compounds is being set up by the National Bureau of Standards under sponsorship of the National Research Council.

First punch cards, containing spectra, bibliographic information, and other useful data on 45 compounds are being made available to industrial and research laboratories.

The catalog is designed to meet the needs of workers seeking to learn the results of others in the study of infrared absorption spectra of chemical compounds.

McCORD
CLASS S.F.
LUBRICATORS

The new improved "SF" Lubricator is an outstanding lubricator, engineered to deliver metered quantities of oil under pressure to cylinders or bearings. Specify McCord, the Standard Lubricator of the Oil Fields. Prompt deliveries.


A McCord development that shows clearly at all times the amount of oil in the reservoir. Made of transparent plastic, the graduated scale indicates the amount of oil. The design provides better visibility from all angles.

McCORD CORPORATION • Detroit 11, Mich.

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for
PETROLEUM REFINERIES

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TURNBUCKLES

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Black or Galvanized

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NORRIS BROTHERS, INC.
Robinson, Illinois

The card catalog provides a series of spectral curves with which the spectra of the unknown compounds can be compared and makes readily available the data needed for theoretical computations without the use of expensive sorting equipment.

By means of the cards, the reported spectra of many compounds can be found quickly, the more important chemical linkages associated with a given spectral line can be determined, the work of any given author can be quickly assembled, and the properties of a compound which will aid in its identification can be located without loss of time.

Sinclair Shipping Solvents

HOUSTON.—Tank-car shipments of light and heavy ordorless solvents have been started by Sinclair Refining Co. from the new facilities at its Houston refinery.

The solvents are used in the paint industry as a principal ingredient in odorless paints.

Major additions to the Houston refinery for manufacture of the solvents were just recently completed.

Platformer Contract Let

Procon, Inc., Chicago, has been awarded the contract for construction of a 16,000-bbl. Platforming unit at Shell Oil Co.'s Wood River, Ill., refinery.

The new Shell unit is being designed for the production of high-octane motor gasoline. Construction is scheduled to begin immediately.

Procon now has under construction a 16,000-bbl. Platformer for aromatics production at Shell's Houston refinery.

Refining Brief

American Cyanamid Co. has undertaken the direct marketing of its soil conditioner, Aerotil, in limited quantities, through established outlets to farmers throughout the nation. Formerly, the company sold the conditioner only to other manufacturers, who marketed it under their own trade names to home gardeners. Aerotil is produced from acrylonitrile. A new American Cyanamid petrochemical plant now building near New Orleans will synthesize that basic from natural gas. When this plant is in operation, it is reported the price of Aerotil will be reduced.

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Steel

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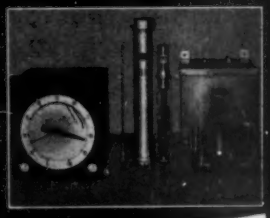

GAGETRON Applied to Measurement of Catalyst Level

New industrial application of atomic energy employs radium and hydrogen tube. Catalyst level is measured by number of atomic impulses passing through the counter tube. The primary element is the GAGETRON.

The GAGETRON is manufactured under Graham Patent No. 2,565,963.

FREE! Safety Code for use of radium. Also GAGETRON Bulletin No. 149.

INSTRUMENTS, INC.
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Easy does it!

BETTER FASTER SAFER

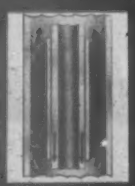
NEW MISSION E-Z SWABS

Under the most adverse conditions, Mission engineers have proved beyond any doubt that Mission E-Z Swabs are far superior to any other swab ever before made available to the oil industry. Performance runs have proved that Mission E-Z Swabs practically eliminate line breakage, eliminate junk in tubing, control the amount of fluid lifted and give longer trouble-free life. Specify Mission E-Z Swabs at your supply store. *If Mission E-Z Swabs do not prove more satisfactory in comparative tests than the make you are now using, the entire purchase price will be promptly refunded.*

MISSION MANUFACTURING CO

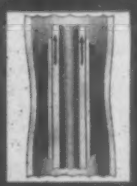
HOUSTON, TEXAS

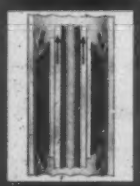
Export office: 30 Rockefeller Plaza, New York



On the down stroke fins are in normal upturned position, allowing E-Z Swab to fall free.

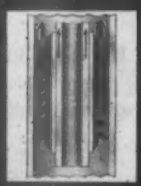
Flexibility of fins allows EZ Swab to pass smoothly through tight spots on up or down stroke.





E-Z Swabs automatically by-pass fluid overload. Each rubber will lift approximately 400 feet of fluid. Rubber fins bend down and unload excess fluid.

After overload fluid is passed fins spring up and seal against tubing.



Among the

Drilling Contractors

New Drilling Company Formed for Georgia Test

Clinch Drilling Co. is a newly formed company which will do the drilling at a rank wildcat test being undertaken by George J. Morott and associates in southern Georgia. The new company is owned by the operators, who include, in addition to Morott, Brady Belcher of Centerville, Ala.; John D. Nable, Hazelhurst, Miss., and Arthur Williams, Brownsville, Tex. The test, projected to 6,500 ft., and designated as 1 Griffis, is located in Clinch County, 8 miles northeast of Fargo, and 10 miles north of the Florida line.

Warren Drilling Co., Tulsa, is drilling for Helmerich & Payne, Inc., of Tulsa at a new operation in the Southwest Victory Hill area in Pottawatomie County, Oklahoma. The test, 1 Brandt, NW SE SW 18-10n-5e, revives development in the area, which has been inactive since the abandonment of the discovery well.

Glenn Drilling Co., Tulsa, has contracts with Alec M. Crowell and associates of New Orleans for two 6,000-ft. Travis Peak exploratory tests in the Fouke area of Miller County, southwestern Arkansas. One is located 8 miles west of Fouke in the C SE NW 20-17s-28w. The other is 6 miles west and a mile south of town in 28-17s-28w.

Sam Gilbert, (left), tool pusher, and Travis Fore, driller, for G. E. Kadane & Sons, Wichita Falls, Tex., contractors on a wildcat test being drilled for Hunt Oil Co. in Howard County, West Texas.

New Illinois Drillers

Frank L. Strickland, Mount Vernon, Ill., and Joe Nickolick, Evansville, Ind., have formed a new drilling contracting partnership to operate as the Petro Drilling Co. Headquarters are at Mount Vernon.

Delta Drilling Co., Tyler, Tex., is moving a large rotary rig from West Texas to the Renova area in Pennsylvania where it is under contract to drill for New York Natural Gas Co. L. A. Bates, Henderson, Ky., will be tool pusher on the rig.

Poteet & Wysor have a 4,500-ft. semiwildcat test under way for Absher & Booth at 1 Petterson, NE SW NW 18-7n-8e, west of the north sector of the Fish pool, Seminole County, Oklahoma.

Fortenberry Drilling Co., Natchez, Miss., has started a Wilcox test for J. Paul Ratliff, Jr., at a wildcat location 3 miles west of Fayette, in Jefferson County, Mississippi. Location is for 1 Fairly, in 65-9n-1e, which is a mile west of abandoned Tuscaloosa production in the South Fayette field.

Glasscock Drilling Co., Shreveport, is moving a rig to a wildcat location 3¾ miles west of Simsboro, western Lincoln Parish, Louisiana, where it will drill for Camco Oil Corp. of Boston at 1 First National Bank of Acadia, in 23-18n-5w. Hole is projected to the Travis Peak.

Dorris Ballew, Inc., Natchez, Miss., has a new wildcat operation under way for Continental Oil Co. in southwestern Winn Parish, eastern Louisiana. Location is northeast of Mount Zion, in 26-9n-5w, on the operator's Bishop lease. Objective is the Paluxy sand, expected around 7,000 ft.

W. L. Hartman, Wichita, Kans., is the contractor on the rank wildcat test which Colorado Interstate Gas Co. is undertaking in northwestern Morton County, in the southwestern corner of Kansas. Location, in the SW SW SW 3-32-43, is 11½ miles west of Richfield

tops in the oil country

Prevents pipe threads from galling and seizing—protects threads—lengthens life of drill string. Those are reasons why 'Bestolife Lead Seal Tool Joint and Casing Compound has been tops in the oil country for 20 years. Unconditionally guaranteed. Sold and exported by supply houses the world over.

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FOR ALL OIL FIELD DIGGING

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A self-contained ditcher operating under its own power—digs clean, even 4" and 6" trenches to a 42" depth.
Light weight, mobile, low operating and maintenance costs. DITCH WITCH digs as many feet of trench as machines four times its size. Right for all oil field needs.

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PROVED BEST BY TEST FOR OIL SHOW ANALYSIS! Simple to operate. Lamp weighs only 1 lb. Models available for 110 volt AC or with adapter, 110 volt DC current. Battery operated model for field use holds lamp, has built-in viewer for daylight examination. Easily portable. Send for FREE brochure OG, "How to detect and analyze petroleum in oil surface samples with ultra-violet".

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and about 3 miles from the Colorado line.

Kemp Drilling Co., Shreveport, contracting for National Gas & Oil Corp., has started a 7,000-ft. test at Section 28 Dome, St. Martin Parish, coastal Louisiana. Hole is projected to 7,000 ft. Location is for 1 Price estate, in 32-9s-7e.

Morrison Drilling Co., Cut Bank, Mont., has a rig working on a wildcat test in the Dutton area, Fremont County, Wyoming, where it is drilling for Perry Fulk at 1 Roberts. Location is in the SE SE SW 25-32n-91w.

Helmerich & Payne, Inc., Tulsa, is drilling on a projected 11,500-ft. test for Shell Oil Co. at a wildcat location 5 miles southeast of the Elk City field in western Washita County, Oklahoma. Location is on the operator's Adams lease in the C SE SE 6-9n-19w.

Empire Drilling Co., Wichita, Kans., is drilling on a contract with Carter Oil Co. at 1 Government, a wildcat in the Twenty-Mile area, Natrona County, Wyoming. Location is in the SE SE SE 27-36n-79w.

Mid-America Drilling Co., Tulsa, is drilling for Beach & Talbot at a wildcat location in southwestern Payne County, near the Logan County line, in Central Oklahoma. The test is at 1-D Feagin-Lloyd, in the SW NE NW 16-17n-1e, northeast of the Southeast Coyle field.

Viersen & Cochran, Inc., Okmulgee, Okla., is contracting for Continental Oil Co. at 1-A Gant, a wildcat test in the north central part of Love County, southern Oklahoma. Location is in the SE SE SW 16-6s-1e, 7 miles north and 5 miles west of Marietta.

ACTIVE ROTARY RIGS*

(United States and Western Canada)

Area—	Week ended 8-11-52	Change week ended 8-4-52	Change week ended 8-13-51
Gulf Coast	524	— 3	— 66
N. & W. Tex.-N. M.	745	—10	—188
Ark.-N. La.-E. Tex.	130	— 3	— 27
Oklahoma	289	+15	— 17
Kansas-S. Nebraska	139	— 3	— 48
Illinois-Eastern	149	— 1	+ 5
Rocky Mountains	230	— 5	— 50
Pacific Coast	155	0	— 8
Total U. S.	2,361	—10	—299
Western Canada	174	+ 9	+ 34
Total	2,535	— 1	—265

*Courtesy Hughes Tool Co. Trends in drilling activity in the United States and the Pacific Coast and Illinois-Eastern areas are shown on pages 202 and 203.

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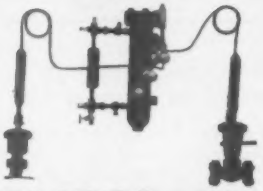

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- **SIMPLE** . . . fewer working parts . . . easy access for adjustment and service.
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- **RUGGED** . . . oversize high tension coils . . . long lasting breaker points . . . ball bearings . . . one piece magnetic rotor.

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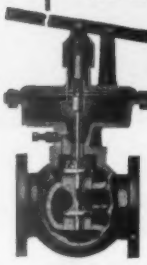

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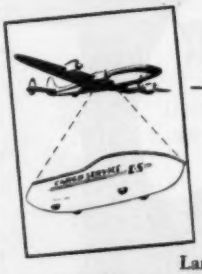

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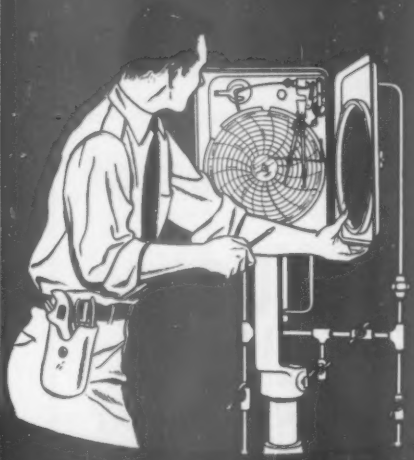

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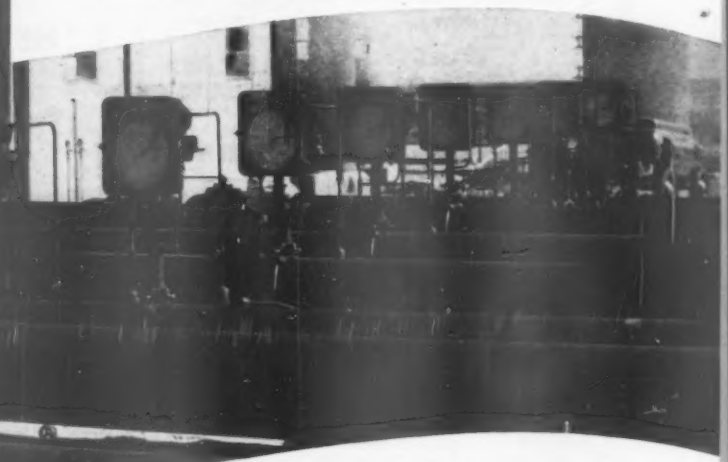

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PIPE LINES

Company Bought

Northern Natural acquires control of Permian Pipeline

OMAHA.—Northern Natural Gas Co. last week announced the purchase of a controlling interest in Permian Basin Pipeline Co.

Permian was formed in 1950 and has planned to build a 384-mile 26 and 30-in. natural gas line to move gas from the Permian basin area of West Texas and eastern New Mexico to a connection with Northern Natural's system at Skellytown, Tex.

Northern Natural has had a management contract with Permian since January 15 and has held since that time an option to buy the stock. The company paid $102,000 for a 51 per cent interest in Permian.

The proposed gas line, an application for which is now pending with the Federal Power Commission, would cost an estimated $60,000,000 and would have a daily capacity of 200,000,000 cu. ft. the first year and 300,000,000 cu. ft. after that.

The new line would obtain gas from the Phillips natural-gasoline plant in the Spraberry area of Texas and from several companies in Lea County, New Mexico.

The line would have compressor stations at Hobbs, N. M., and at Spraberry, Pembrook, and Plymouth, Tex.

Several officers of Northern Natural already have been elected to similar positions in Permian Basin Pipeline, and four Northern officers have been elected to Permian's board of directors.

John Merriam, Northern Natural president, said Permian's offices will be transferred from Chicago to Northern Natural's office building in Omaha.

Phillips Buys Shell Line

Phillips Pipe Line Co. has bought Shell Pipe Line Corp.'s 394-mile, all-welded crude-oil line between McCamey and Brookshire, Tex.

The line parallels roughly the 455-mile, 24-in. Rancho crude-oil line now being constructed by Shell, Phillips, and others from West Texas to the Gulf Coast.

Phillips Pipe Line is a wholly owned subsidiary of Phillips Petroleum Co.

Buckeye Contracts Crossings

Buckeye Pipe Line Co. has awarded contracts for four river crossings for its new products system.

The Rahway River in New Jersey has been contracted by Merritt Chapman and Scott Corp.; the Delaware River between Pennsylvania and New

Dispatching Executives of Pipe-Line Companies Meet

Some of the representatives of natural-gas pipe-line firms as they attended the annual Dispatchers' Round Table Conference of the Southern Gas Association in Tulsa August 8. Left to right are H. L. King, chief dispatcher, Lone Star Gas Co., Dallas; T. B. Kelly, superintendent of dispatching and communication, Texas Eastern Transmission Corp.; A. L. Bristow, chief dispatcher, Northern Natural Gas Co., Omaha, sponsor of the conference; Calvin Scott, dispatcher, Oklahoma Natural Gas Co., Tulsa; and H. G. Pegues, superintendent of dispaching, United Gas Pipe Line Co., Shreveport.

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Jersey and the Raratan River in New Jersey by Bills & Troth Construction Co.; and the Millstone River in New Jersey by Folk Construction Co.

H. L. Gentry Construction Co. has already laid 15 miles of pipe in the building of Buckeye's products system from Linden, N. J., via Allentown, Pa., to upper New York State.

Contracting Firm Formed

DALLAS.—A new pipe-line contracting company, Lone Star Constructors, has been formed by Paul R. Halbert, J. K. Little, and N. K. McFarland.

P. R. HALBERT

The company was formed to build cross-country pipe lines, and river crossing projects and to take up and recondition old pipe lines, according to a company announcement.

J. K. LITTLE

N. K. McFARLAND

McFarland said the firm will have equipment and experienced crews available for construction work anywhere in the United States or Canada.

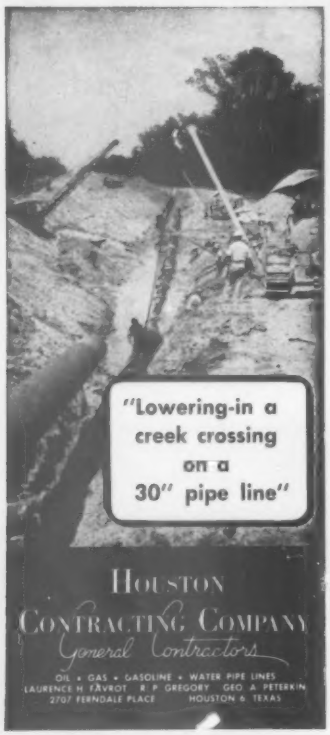
McFarland has been in the pipe-line business 22 years, Halbert more than 25, and Little 15.

U.S. Pipe Line Engages CRC Engineering Services

United States Pipe Line Co. has negotiated a contract with CRC Engineering Services, Houston, for the performance of all engineering and design work and the procurement of materials for the company's proposed products line.

The project has been planned to extend from the Texas City-Houston area via Port Arthur and Beaumont, Tex., and El Dorado, Ark., to Nashville and thence via Cincinnati, Columbus, and Pittsburgh to Newark, N. J. The part of the line southwest of Cincinnati would be 24-in. and the part east of Cincinnati, 22-in. diameter pipe.

A PAD certificate of convenience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and necessity has been granted, but allocation of pipe has not yet been determined.

Gas-Line Mileage Up

Total mileage of natural-gas pipe lines in the United States at the end of 1951 was 406,550 miles, according to Gas Facts, just published by the American Gas Association.

This total mileage represented an increase of 19,080 miles over the total at the end of 1950, the A.G.A. publication says.

TWO-MAN CREW of Superior Oil Co. stringing 3-in. plastic pipe at the Rio Bravo installation. The V-shaped ditch was scraped by a road grader, greatly reducing trenching costs.

Plastic Pipe Laid

Superior uses it for Rio Bravo field water system

BAKERSFIELD. — First California oil-field installation of plastic pipe in any appreciable amount recently was laid by Superior Oil Co. at the unit-operated natural-gasoline plant and camp in Rio Bravo field, 15 miles west of here.

More than 4,000 ft. of 2 and 3-in. transparent, butyrate-type pipe was laid as a water system to serve the two installations. It consisted of about 1,600 ft. of 3-in. and 2,400 ft. of 2-in. pipe, both as main and laterals. The installation also involved use of tees, ells, threaded nipples, and couplings, all of plastic.

A road grader was used to scrape a V-shaped ditch to a depth of 14 or 16 in. Transparent pipe in 20-ft. lengths, one end belled, then was laid at a rate of better than one joint per minute per two-man crew. Joining consisted of "brazing" the two lengths with solvent and then making the connection. At all road crossings scrap steel pipe was placed over the plastic pipe to serve as a protector.

The pipe, manufactured by Kraloy Plastic Pipe Co., Los Angeles, had a wall thickness of about 3/8 in., a bursting pressure in excess of 500 psi., and a maximum working pressure of 125 psi. Tensile strength of the pipe was about 5,400 psi. at 77° F.

Although more than 3,000,000 ft. of small-diameter plastic pipe has been installed in the state in domestic gas-line service, use by California oil companies has heretofore been limited to test installations. One company, however, is preparing to use plastic pipe for a substantial salt-water disposal system in Huntington Beach field.

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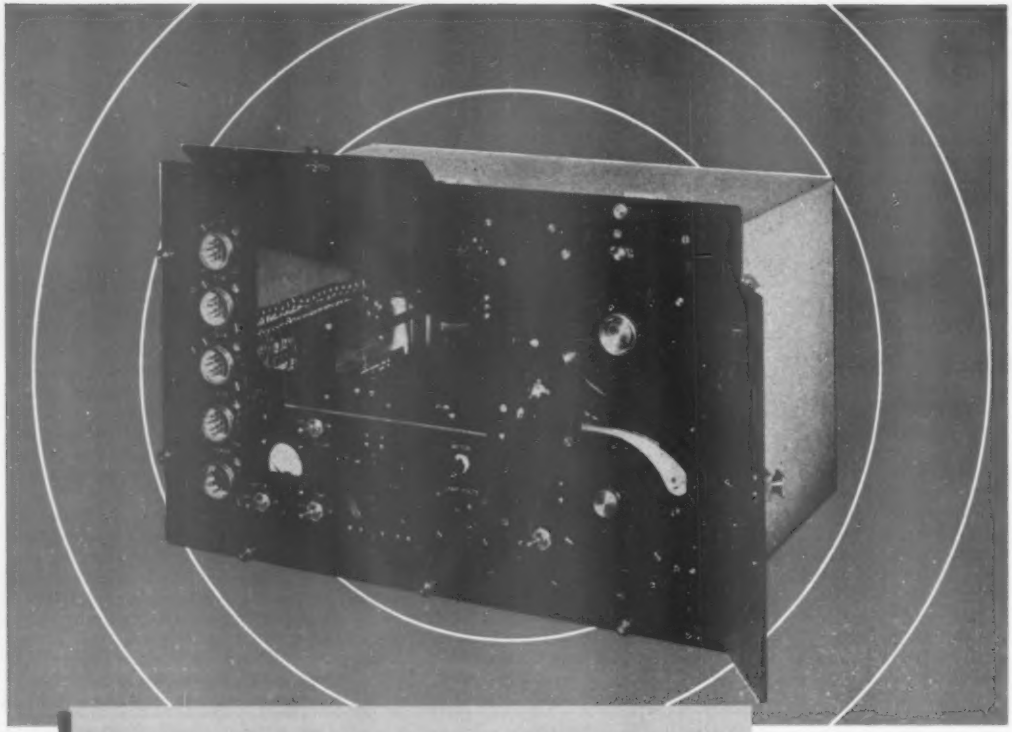

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General GEOPHYSICAL COMPANY

GULF BLDG. HOUSTON

It's the Mesaverde Again

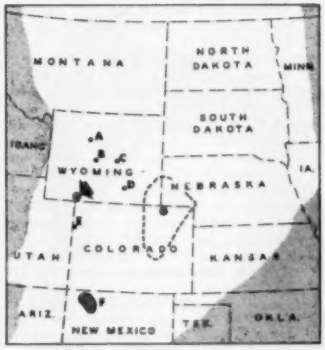
ONCE again the neglected Upper Cretaceous - Mesaverde of the Rocky Mountain region has shown signs of yielding oil in commercial quantities—this time in the Green River basin of Wyoming.

Stanolind Oil & Gas Co. 1 Middle Mountain, 10-12n-103w, Sweetwater County, arrowed on sketch, recovered light-green, 53°-gravity oil on drill-stem tests of the Mesaverde at 6,540 ft. The first test, at 5,636-52 ft. for 1 hour, got gas to the surface in 35 minutes and had a pipe recovery of 720 ft. of oil. The second test, at 6,532-54 ft. for 2 hours, recovered 1,400 ft. of oil and 400 ft. of fresh water. A third test at 6,552-74 ft. is now being made. This well was drilled on a seismic structure. Its surface elevation is 9,300 ft.

Recognition of the potentialities of the sands of the Mesaverde group has been increasing in recent months despite the fact that they have been found productive at but a few, widely separated spots. *(See "A Dark Horse of the Rockies," page 139 of the Journal's December 6, 1951, issue.)*

It is becoming more and more apparent that the only reason the Mesaverde sands have not been more productive is that they haven't been tested. Probably the principal reason for this neglect has been that the sands were "too deep or too shallow." During the mountain - making period which followed the deposition of Cretaceous sediments, the Mesaverde was uplifted and downwarped, later to be cut away from the crests of inviting structures and buried deep beneath Tertiary sediments in the basins. A structure that still has Mesaverde on it hasn't been the type that has dominated Rocky Mountain exploratory effort.

The Mesaverde is one of the big gas-producing formations of the San Juan basin (F on sketch), but to date the only significant production of Mesaverde oil is at Beaver Creek (B). At this Wyoming field, where the Mesaverde was an unexpected bonus, there are seven Mesaverde oil wells. Drilling for Mesaverde oil in this field, which also produces from the Cretaceous-Lakota,



Muddy, and Frontier, and the Pennsylvanian-Tensleep, has been suspended in order to accumulate sufficient reservoir data to determine if further development should be on 40 or 80-acre spacing.

There have been other signs of the Mesaverde's potentialities. Free oil was recovered in a Uinta basin wildcat last year, but the tested interval was found noncommercial. Earlier, a large Mesaverde gas well had been completed on the Douglas Creek arch (E on sketch). The remaining Mesaverde production has been restricted to Wyoming where Golden Eagle (A) once produced gas, West Poison Spider (C) had a deep, disappointing oil well, and Simpson Ridge (D) has eight small oil wells.

The Mesaverde sands, erratic at best, shale out completely as the fairway of the Cretaceous geosyncline (unshaded area on sketch) is approached. The Hygiene sand is the last recognized major sand tongue to pinch out toward the east in the upper part of the Pierre shale. The pinchout of this sand falls near the center of the gentle east flank of the Julesburg basin (G on sketch). The eastern limit of this porosity wedge can be pretty well tied down; however, because the Julesburg basin dosn't seem to be very well saturated with oil or gas, a trap is going to have to be more than just a straight - line pinchout. It is going to take eastward-extending (updip) irregularities of the sand body to have reservoired oil. Clues for finding such traps may soon unfold.

Significant developments in Mesaverde sands can be expected as a result of Stanolind's indicated discovery. It can no longer be doubted that the formation has neglected potentialities of great importance.

Philip C. Ingalls.

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

OKLAHOMA . . . Carter Oil Co. is continuing production tests in upper Marmaton lime at 1 Hugh W. Dorman, C NW NW 29-5n-22ecm, Beaver County discovery. Latest reported swab gage was 40 bbl. of oil in 8 hours from perforations at 5,590-92 ft.

COLORADO . . . In northeastern Colorado F. Kirk Johnson et al have an apparent "J" sand gas discovery east of Sterling, for the first production in the southeast half of the county.

MONTANA . . . The Texas Co. found additional saturated Ordovician section and tested more oil and gas-cut mud with salt water at 1 NP G (NCT 4), wildcat 4 miles north of the Cedar Creek discovery.

WILLISTON BASIN . . . New wildcat locations in extreme northeastern Montana were of principal importance in developments in Montana and North Dakota during the week. Both Sheridan and Phillips counties had new locations in the large undrilled area which is roughly in the center of the basin.

Permian Basin

Mississippian Strike Due In Sterling

MIDLAND.—Sterling County had a Mississippian limestone discovery in the making, located 12 miles north of Sterling City and 2 miles southwest of the Spade Ellenburger discovery.

The new well is Austral Oil Exploration Co., Inc., 1 Ellwood estate, which kicked off after 10 hours of swabbing on perforations at 8,070-94 ft. and flowed at the rate of 5-7 bbl. of oil an hour. In 24 hours the well tanked 137 bbl. of oil, with no water, through 18/64-in. tubing choke. An acid treatment of 500 gal. failed to increase the oil yield. Total depth was around 8,163 ft. in Ellenburger dolomite. Top of the Mississippian chert was 8,080 ft., on elevation of 2,429 ft.

In Estor County, V. A. Brill 1 Fasken had additional oil shows in the Wolfcamp, tested at 9,825-95 ft. Recovery was 633 ft. of slightly gas-cut mud, and 990 ft. of oil and gas-cut mud. Bottom 360 ft. of mud was estimated to be 75 per cent oil. Drilling continued below 9,940 ft.

In Culberson County, Magnolia Petroleum Co. 1-A Homer Cowden, deepest of five exploratory tests under way, had total depth at 11,650 ft. and was preparing to test the interval between 11,550-650 ft. Last test, open 1 hour at 11,450-550 ft. developed 20 ft. of mud with no shows. Tentative top on the Ellenburger was 11,260 ft. on elevation of 3,917 ft.

El Paso Natural Gas Co. 1 Grisham-Hunter, 20 miles northwest of Toyah, was drilling below 7,042 ft. The company's 1 Grisham-Hunter "L," 21 miles north of Kent, was drilling at 7,185 ft. Both were projected to around 10,000 ft.

G. E. Seals 2 Gulf-Grisham-Hunter, 36 miles northwest of Toyah, shallow cable-tool operation 36 miles northwest of Toyah, was drilling in shale at 1,250 ft.

Continental Oil Co. 1 J. B. Foster, 16 miles southwest of Grisham's gas discovery, had total depth at 3,366 ft., on an 8,000-ft. contract.

Richardson & Bass 1 Grisham-Hunter-State, 48 miles northeast of Van Horn, was still a location. Contract depth was 9,000 ft.

WEST TEXAS (DISTRICTS 8 AND 7-C) SUCCESSFUL WILDCATS

Crane County: Shell Oil Co. 2 John Edwards, 18-B17-PSL, TD 7,774 ft., elev. 2,694 ft., PB 4,989 ft., IP pumped 43 bbl. 36°-gravity oil.

Runnels County: Gilchrist Drillign Co. 1 D. M. Bomar, Sec. 49, GH&H Sur., TD 3,460 ft., pay 3,405 ft., IP 65 bbl. 42°-gravity oil, ½-in. choke, GOR 1,450 cu. ft., TP 260 psi.

Tom Green County: Stanolind Oil & Gas Co. 1-C Johnson, Geo. Smith Sur. 1,813, TD 150 ft., PB 53 ft., conglomerate pay 27 ft., IP pumped 22 bbl. 25°-gravity oil.

WEST TEXAS (DISTRICTS 8 AND 7-C) WILDCAT FAILURES

Cochran County: Texas Pacific Coal & Oil Co. and Seaboard Oil Co. 1 Landon, Acct. 1, 5-153-Sherman CSL, dry, TD 5,026 ft., elev. 3,930 ft., San Andres 4,151 ft.

Crane County: Shell Oil Co. 1-D Edwards, 27-B17-PSL, dry, TD 4,980 ft., elev. 2,685 ft., Tubb 4,763 ft.

Crockett County: Magnolia Petroleum Co. 1 J. W. Henderson, 7-SK-TCRR, dry, TD 12,769 ft., elev. 2,223 ft., Devonian 10,385 ft., Silurian 10,606 ft., Simpson 10,855 ft., Ellenburger 11,334 ft.

Texas Pacific 1-A Bair, 44-1-I&GN, dry, TD 9,673 ft., elev. 2,092 ft., Strawn 7,805 ft., Devonian 7,975 ft., Simpson 8,385 ft., Ellenburger 9,170 ft.

Glasscock County: Olsan Bros., Inc. 1-A L. C. Clark, 8-32-T4S-T&P, dry, TD 5,000 ft.

Lynn County: Shell Oil Co. 1 Southland Royalty, 1-2-L&SV, dry, TD 10,610 ft., elev. 3,146 ft., Spraberry 6,527 ft., Pennsylvanian 9,434 ft., Mississippian 10,020 ft., Ellenburger 10,460 ft.

Menard County: Allison and Bolkmann 1 F. A. Volkmall, 61-4-GWT&P, dry, TD 4,818 ft., Strawn 3,150 ft., Ellenburger 3,770 ft., Hickory 4,755 ft.

Mitchell County: Hunt Oil Co. 1 Lucy K. Hodnett, 89-97-H&TC, dry, TD 8,020 ft., elev. 2,250 ft., Pennsylvanian 7,325 ft., Strawn 7,517 ft.

Pecos County: Brown & Thorp 1 Lowery & Wilson, 30-Z-TCRR, dry, TD 2,000 ft. Hunt Oil Co. 43 Elsinore, 64-D-GC&SF, dry, TD 1,075 ft.

Reagan County: Union Oil Co. of California 2-D Scott, 176-1-T&P, dry, TD 11,198 ft., elev. 2,745 ft., Strawn 10,060 ft., Devonian 10,225 ft., Silurian 10,440 ft., Ellenburger 10,610 ft.

Runnels County: Blackwell Oil & Gas Co. 1 Albert Spreen, Sec. 99, Rusk Transportation Co. Sur., dry, TD 3,754 ft.

Slick Moorman Co. 1 Claude Brookshire, Sec. 140, Sam Brookshire Sur., dry, TD 3,795 ft.

Schleicher County: La Gloria Corp. and E. L. Cox 1 Williams, 24-1-GH&SA, dry, TD 6,000 ft., elev. 2,289 ft., Canyon 4,361 ft., Strawn 5,149 ft., Ellenburger 5,781 ft.

Pan American Production Co. 1 Henderson, 4-A2-GH&SA, dry, TD 6,884 ft., elev. estimated 2,295 ft., Strawn 5,341 ft., Ellenburger 6,775 ft.

Scurry County: J. P. Hurndall and R. A. Gray 1 Ida Ganaway, 89-3-H&TC, dry, TD 7,480 ft., elev. 2,284 ft., Mississippian 7,200 ft., Ellenburger 7,360 ft.

Ward County: Standard Oil Co. 1 S. T. Christy, 63-34-H&TC, dry, TD 4,000 ft.

TEXAS PANHANDLE (DISTRICT 10) WILDCAT FAILURES

Roberts County: Cities Service Oil Co. 1 Theis, 177-2-I&GN, 20 miles NW Miami, dry, TD 11,758 ft., elev. 2,891 ft., Douglas 5,584 ft., Mississippian 8,845 ft., Osage 10,022 ft., Hunton 10,560 ft., Viola 10,920 ft., Simpson dolomite 11,264 ft., Simpson sand 11,368 ft., Ellenburger 11,534 ft.

G. B. Cree Jr. 1 Locke, 102-M2-BS&F, 3 miles NW Miami, dry, TD 4,274 ft., elev. 2,993 ft.

SOUTHEAST NEW MEXICO

Richardson & Bass 1 Cobb-Federal, eastern Eddy County wildcat in 23-20s-31e, had completed rig repairs and was coring ahead from 7,060-7,104 ft., apparently in the Delaware sand. Shows of oil and oil-cut mud have been recovered from 6,938-7,029 and 6,981-7,059 ft.

Gulf Oil Corp. 1 Federal-General American Oil Co., deep exploration in Jackson field of Eddy County, was drilling below 6,883 ft.

The Texas Co. 1-BO State, northeast extension to Moore Devonian field in Lea County, gaged 44 bbl. of oil the first hour and 50 bbl. the second hour of a drill-stem test from 10,462-525 ft. Flowing pressure ranged from 930-3,680 psi.

Lawton Oil Co. 2 State-Gulf, 10-13s-33e, discovery prospect south of Hightower field, had a total indicated 250-ft. pay section in the Devonian. Last drill-stem test from 11,342-470 ft. had gas at the rate of 1,320,000 cu. ft. daily and yielded 26 bbl. of 53°-gravity oil, flowing at the rate of 6 bbl. hourly.

SOUTHEAST NEW MEXICO WILDCAT FAILURES

Eddy County: Kincaid & Watson 2 Cole-Federal, 29-16s-29e, dry, TD 2,319 ft.

Lea County: Magnolia Petroleum Co. 1 J. D. Black, 9-15s-36e, dry, TD 13,763 ft., elev. 3,929 ft., Mississippian 12,850 ft., Devonian 13,712 ft.

South Louisiana

Final Gage Reported At Acadia Well

NEW ORLEANS.—In the northwest Branch area, Acadia Parish, Sunray Oil Corp., has reported a final gage on the 1 Cyprien Fontenot for 89 bbl. of 50.1°-gravity oil plus 1,300,000 cu. ft. of gas daily through perforations at 11,196-206 ft. Well, bottomed at 12,600 ft., has 7-in. casing cemented at 10,686 ft. and 2⅜ tubing swung at 11,200 ft., flowed through 8/64-in. choke. Tubing pressure registered 5,850 psi. with gas-liquid ratio of 14,607:1. Prior to taking final potential operator recovered 9 ft. of gas-distillate sand at 10,610-642 ft., 18 ft. of gas-distillate sand at 10,768-868 ft., and a recovery of 7 ft. was reported at 11,187-210 ft. New discovery is located in Section 80-8s-2e, approximately 2½ miles northwest of Branch townsite.

A flow of 59.8 bbl. of 43.8°-gravity distillate plus 5,325,000 cu. ft. of gas daily through a 16/64-in. choke has been reported by Gulf Refining Co. at the 1 Martha De Rouen et al, Calcasieu Parish discovery. Well, bottomed at 11,590 ft. in sidetracked hole, with 5½-in. casing set at 11,540 ft., flowed through perforations from 10,924-954 ft. with tubing pressure of 3,900 psi. and gas-liquid ratio 89,000 to 1. Discovery previously flowed 42.3 bbl. of 43.8°-gravity distillate plus 3,910,000 cu. ft. of gas through a 1/64-in. choke on a 3½-hour test. Well is located in Section 15-11s-6w.

The California Co. has reported to be drilling ahead below 11,577 ft. on the 1 Calo-Superior Amelia Bailey, Lafourche Parish wildcat, after setting 7-in. casing at 10,837 ft. No report has been made on electric log run to 11,500 ft. prior to setting the casing on the projected 12,500 ft. test located in Section 61-17s-21e.

The Texas Co. has staked location for a 11,000-ft. wildcat test at Lake Ponchartrain, Orleans Parish, to be carried as the 1 Louisiana State 2005-Pt. Aux Herbes. Well will be located approximately 10 miles northeast of New Orleans in Township 10s, Range 13e.

SOUTH LOUISIANA WILDCAT FAILURES

Allen Parish: Continental Oil Co. 1 Forest Lumber Co., 30-2s-2w, dry, TD 12,542 ft.

Calcasieu Parish: Mac Drilling Co. 1 Farmers Land & Canal Co., 15-10-7w, dry, TD 10,602 ft.

Superior Oil Co. 1 E. O. Daughenbaugh et al, 29-16s-7w, dry, TD 11,302 ft.

Jefferson Parish: The California Co. 1 J. R. Ruttley, 15-17s-24e, dry, TD 11,300 ft.

Plaquemines Parish: The California Co. 2-A Lt. State 1785, 20-16s-17e, dry, TD 9,416 ft.

Wm. G. Helis Est. 1 Plaquemines Parish

School Bd., 7 miles NE of Houma, dry, TD 10,100 ft.

St. Mary Parish: Union Production Co. 2 St. Lse. 1684, Six Mile Lake, dry, TD 13,045 ft.

Washington Parish: Eagle Drilling & Development Co. 1 Gaylor Container Corp. fee, 15-4s-12e, dry, TD 7,823 ft.

Mississippi

Pistol Ridge Well Finaled In Wilcox

JACKSON.—In Pistol Ridge field, Forrest County, Mississippi, Sun Oil Co. has completed 1 McCardle-Clark unit, Section 18-1s-13w, as a Wilcox gas well. This is the third gas producing horizon for the field. It will be recalled that log and sidewall cores had indicated sand with good shows of gas at 4,989-94 ft. in the lower Wilcox. Subject test was carried to the Tuscaloosa zones that have produced gas in previous wells. Several tests of these horizons indicated only low volume gas production, so operators plugged back and perforated 4,988-96 ft. opposite the above mentioned Wilcox sand. On completion test the well flowed at the estimated rate of 2,800,000 cu. ft. of gas plus 20 bbl. of 62.5°-gravity condensate per day through ⅜-in. choke with tubing pressure of 1,900 psi. This sand is approximately the same zone of the Wilcox that produces gas at Baxterville field. The gas accumulation is on the down-thrown side of a 250-ft. fault which was encountered at the base of chalk at 6,976 ft.

In Adams County, Mississippi, two Wilcox wildcats being operated by John S. Callon are preparing to test good shows of oil that are expected to make two new discoveries. The 1 R. L. Emery, Jr., Section 35-6n-1w, approximately 4½ miles east of La Grange field, had good shows of oil in sidewall cores at 6,346-54 ft. Casing is being run for completion test without making a drill-stem test. Callon 1 James W. Vaught, Section 1-5n-1w, approximately 3 miles northeast of Pellucid Bayou field, was drilled to total depth of 6,814 ft. in Wilcox. Log and sidewall cores indicated 7 ft. of oil sand in the Minter zone of the Wilcox. On 10-minute drill-stem test at 6,588-93 ft. using ¼-in. chokes, recovery was 3,690 ft. of oil and no salt water. Top pressure was 16 psi., and bottom-hole flowing pressure was 1,650 psi. Casing is being run for completion test.

The Florida peninsula has experienced an increase in activity the past few months. There are now six seismic crews working in the area. Two are for Gulf Oil Corp., and one each for Sun Oil Co., Humble Oil & Refining Co. Continental Oil Co., and Commonwealth. It is reported that three more crews are to be moved into the area. This increase in geophysical activity was preceded by a considerable amount of leasing.

MISSISSIPPI WILDCAT FAILURES

Adams County: B. Serio-Gulmon & Johns 3 Parker heirs, 38-7n-1w, dry, TD 6,515 ft.

Amite County: Kirby Petroleum Co. 1 C. M. Wells, 23-3n-5e, dry, TD 8,010 ft.

Carroll County: Billups Bros.-B. Serio 1 N. H. Heath, 29-21n-4e, dry, TD 4,696 ft.

Franklin County: American Mineral Spirits Co. 1 W. J. Wright, 29-6n-1e, dry, TD 7,015 ft.

I. P. LaRue 1 U.S.A., 31-7n-5e, dry, TD 11,015 ft.

Jefferson County: J. Paul Ratliff, Jr. 1 Mrs.

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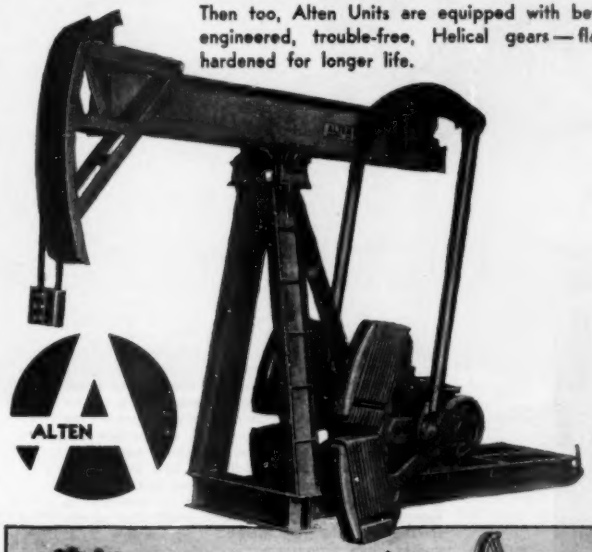

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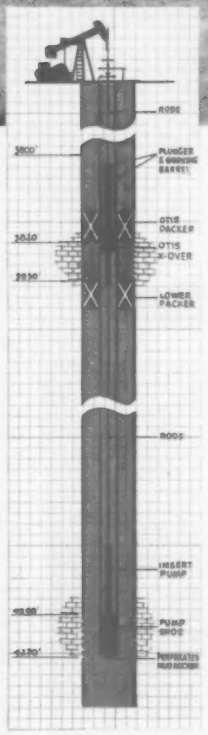

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Otis Two-Zone Pump

OTIS PRESSURE CONTROL, INC.

Dee Brown Fairley, 65-9n-1e, dry, TD 6,296 ft.

Lincoln County: LaGrange Petroleum Co. 1 Franklin heirs, 3-6n-7e, dry, TD 10,664 ft.

ALABAMA WILDCAT FAILURES

Escambia County: Humble Oil & Refining Co. 1 Ora N. Johnson et ux, 27-n-9e, dry, TD 6,750 ft.

Sunnyland Contracting Co. 1 R. L. Goldsmith. 12-n-6e, dry, TD 6,678 ft.

Louisiana-Ark.

Wilcox Discovery Finaled In Catahoula Parish

SHREVEPORT.—Hunt Oil Co. et al have completed 57 Louisiana Delta Hardwood Lumber Co., C NW SE 20-6n-5e, flowing 102 bbl. of oil daily through 9/64-in. tubing choke. The new Wilcox discovery is located in southern Catahoula Parish. Production is from Wilcox perforations 5,150-56 ft. Tubing pressure is 370 psi., casing pressure 500 psi. The new discovery has tentatively been named Big Bayou field.

The Texas Co. is pulling testing tool at 1 J. C. Williams, Jr., NW SW 2-15n-15w, Caddo Parish, to check the recovery of a drill-stem test from 9,221-58 ft. of Cotton Valley series sand. Top of the Cotton Valley was called at 8,490 ft. Prior to the test a core was taken from 9,221-58 ft. with recovery being 37 ft., 1 ft. of shaly fine grained, hard sand with gas odor and slight fluorescence, 15 ft. of black shale, 9 ft. of shaly sand with faint gas odor and 12 ft. clean, fine grained sand with gas odor, light tan stain with pinpoint fuorescence.

In De Soto Parish Frank W. Scheller 1 Davis et al are waiting on orders. Wildcat is located in the Bull Bayou area, 5 miles southwest of Evelyn. Total depth is 3,021 ft. On perforations 2,959-70 ft., operator tested salt water and squeezed. The wildcat tested dry from perforations 2,724-38 ft., also tested dry with a show of gas from 2,705-12 ft. Well was then plugged back and perforated from 1,585-87 ft. and squeezed.

Arkansas.—B. E. Hill et al are testing to tanks at 1 Freeman Smith Land Co., NW NE SE 14-16s-13w, apparent Calhoun County discovery, 4 miles northwest of Moro Bay. The wildcat is reported to be flowing 50 bbl. of oil daily through 8/64-in. choke from perforations 3,458-60 ft.

LOUISIANA WILDCAT FAILURES

Catahoula Parish: Pure Oil Co. 1 Nebo Oil Co., C SW SW 2-9n-5e, dry, TD 5,207 ft.

Justiss-Mears Oil Co. 1 Tensas Delta Lumber Co. "A," dry, TD 5,869 ft.

Concordia Parish: Hunt Oil Co. and Gulf Refining Co. 7 F. F. Yakey, C NW SE 32-4n-8e, dry, TD 7,449 ft.

Winn Parish: Brown Paper Mill Co. 4 Fee, C SW NW NW 4-12n-1w, dry, TD 5,086 ft.

ARKANSAS WILDCAT FAILURES

Cross County: Cross Oil Co. 1 Rhodes, 446 ft. NE of C Sec. 20-8n-2e, dry, TD 1,869 ft.

Nevada County: McAlester Fuel Co. 1 Riley A," C SW SW SW 20-14s-22w, dry, TD 2,870 ft.

Union County: T. L. James & Co. 1 Taunton, 150 ft. W of C NE NE SW 21-19s-12w, dry, TD 7,604 ft.

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North-Central Texas

Three Wells at Production Stage in Montague

WICHITA FALLS.—Montague County had three discovery wells in the production stage. In the southwest corner of the county, 2 miles south of Eanes field, Larson & Thomas 1 J. M. McFall gaged 4,100,000 cu. ft. of gas daily, open flow, plus some 300 bbl. of distillate. Pay is the conglomerate from 6,006-18 ft. On test through 16/64-in. choke, the well flowed 1,474,000 cu. ft. of gas daily plus 112 bbl. of distillate. Shut-in pressure registered 1,640 psi.

South of Belcherville, Jack Grace Production Co. 1 J. W. Bussey flowed 205 bbl. of 44°-gravity oil in 4 hours, on ½-in. choke and from pay between 5,610-35 ft.

King & Heyne, Inc. 1 Wilson, wildcat 7 miles northeast of Ringgold, developed 1,890 ft. of clean oil on a 1-hour drill-stem test of the conglomerate at 5,810-40 ft.

Southwest of Fruitland, Russell Maguire 1 Whitehead, discovery in the W. Bond Survey, gaged 51 bbl. of 42°-gravity oil a day through 18/64-in. choke, from perforations at 5,804-28 ft.

East of Ringgold, King & Heine 1 William Randolph, prepared to run pipe for production tests after recovering 1,800 ft. of oil on drill-stem test. A 1-hour test was run in the Bend conglomerate from 5,831-37 ft.

Cox Drilling Co. 1 Bailey-Talley Unit, wildcat 5½ miles northeast of Sadler in Grayson County, developed salt water on a drill-stem test at 3,674-84 ft. and was drilling ahead. Humble Oil & Refining Co. 1 Mark Williams, 3 miles northwest of Sandusky, had surface casing set.

Miami Operating Co., Inc. 2 Clyde Parker, 26-2-T&NO, in the newly opened pool 2½ miles southwest of Novice in Coleman County, had prospects of giving the area its third pay zone. Discovery production for the field was in the Gray sand, and second well was in the Palo Pinto limestone. The 2 Parker developed oil on drill-stem test of the Gray sand at 3,844-49 ft. Drill-stem test in the Gardner sand from 3,695-3,715 ft. recovered 800 ft. of oil, 140 ft. of oil and gas-cut mud and 200 ft. of salt water. Completion was to be attempted from the lower pay section.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) SUCCESSFUL WILDCATS

Jones County: Lester & Duffield 1 City of Abilene, 87-14-T&P, TD 2,312 ft., elev. 1,657 ft., Gunsight 2,092-98 ft., IP pumped 78 bbl. 38°-gravity oil.

Throckmorton County: Cox Drilling Co. 1 Annette Davis, Blk. 93, Comanche Indian Reservation, TD 4,886 ft., elev. 1,449 ft., Mississippian (?) pay 4,852 ft., ft., IP 150 bbl. 43°-gravity oil, 8/64-in. choke, TP 190 psi., GOR 1,000 cu. ft.

Wichita County: Tobe Foster 1-C Lochridge, L. Netherly Sur., A-240, TD 2,999 ft., pay 2,940 ft. IP pumped 100 bbl. 43°-gravity oil.

Wilbarger County: Frank Wood 1-BBB Waggoner, 17-4-H&TC, TD 2,825 ft., pay 2,389 ft., IP pumped 32 bbl. 37°-gravity oil.

Frank Wood 1-CCC Waggoner, 33-4-H&TC, TD 1,194 ft., pay 1,179 ft., IP pumped 18.7 bbl. 39°-gravity oil.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) WILDCAT FAILURES

Archer County: Ada Oil Co. 1 B. D. Ikard, Blk. 1,889, TE&L Sur., dry, TD 4,175 ft. McAlester Fuel Co. 1-A Abercrombie, H.

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Ted A. Norwood 1 Johnnie P. Griffin, Wm. H. Spillers Sur. 124, dry, TD 1,854 ft.

Baylor County: Crown Central Petroleum Corp. 1 Cora Morris, 100-A-BBB&C, dry, TD 6,087 ft., elev. 1,321 ft., dolomite 6,045 ft.

Callahan County: J. K. Wadley 1 M. S. Johnson, Sec. 18, BBB&C Sur., dry, TD 1,346 ft.

Wadley 1 J. T. Mathis, Sec. 18, BBB&C Sur., dry, TD 1,391 ft., elev. 2,025 ft., Saddle Creek 935 ft.

Coleman County: National Petroleum Corp. 1 J. L. Ray, Sec. 107, ETRR Sur., dry, TD 3,530 ft.

United North & South Development Co. 1 Ragsdale, Sec. 6, T&NO Sur., dry, TD 3,672 ft., elev. 2,123 ft., Morris 3,251 ft., Jennings 3,504 ft., Gray 3,636 ft.

Western Petroleum Co. 1 W. C. Beck, 56-1-GHH, dry, TD 3,375 ft., elev. 1,803 ft., Capps 2,926 ft.

Comanche County: J. E. Whiteside 1 Sid Johnson, Sec. 32, Lampasas CSL, dry, TD 2,650 ft.

Cooke County: Kay Kimbell 1 Martha M. Kays, Blk. 97, Fannin CSL, dry, TD 6,716 ft.

Eastland County: Jewel Kimberlain 1 Joe Morton heirs, Sec. 4, T&NO, dry, TD 1,503 ft.

Fisher County: Frank Pethybridge 1 T. A. Jean, 201-1-BBB&C, dry, TD 3,825 ft.

Haskell County: Samedan Oil Co. 1 Jessie McDonald, 52-1-H&TC, dry, TD 5,760 ft.

Fox Witherspoon 1 O. R. Kittley, 71-9-Red River CSL, dry, TD 5,979 ft.

Jack County: W. H. Hammon 2 Ira Coats, Wm. Berryman Sur., A-40, dry, TD 3,599 ft.

J. L. McMahon Jr. 1 J. W. Carter, Sec. 2,759, TE&L Sur., dry, TD 4,861 ft., Caddo 4,490 ft., conglomerate 4,842 ft.

T. O. C. Oil Co. 3 Lillie Humpheries, I. E. Graves Sur., A-951, dry, TD 2,245 ft.

Upham Gas Co. 1 C. O. Boaz, Sec. 3, SPRR Sur., dry, 4,084 ft., elev. estimated 1,200 ft., Caddo 3,938 ft., Mississippian 4,795 ft.

Jones County: Lewis Mahan 1 J. L. Barnard, Sec. 21, HT&B Sur., dry, TD 2,160 ft.

The Texas Co. 1 W. N. Williams, 17-19-T&P, dry, TD 4,526 ft.

Lampass County: Polland & Davis 1 Sealy Smith Foundation, Sec. 16, C&BN Sur., dry, TD 3,285 ft., elev. 1,146 ft., Ellenburger 2,955 ft.

Montague County: Cox Drilling Co. 1 Marvin Shaw, Sec. 20, Limestone CSL, dry, TD 6,369 ft.

Nolan County: Houston Oil Co. of Texas 1 L. E. Adrian, 53-20-T&P, dry, TD 6,465 ft., elev. 2,504 ft., Strawn 5,578 ft., Odom 6,102 ft., Caddo 6,314 ft., Ellenburger 6,438 ft.

Palo Pinto County: Lowry at al 1 G. L. Hudson, J. F. Bates Sur., dry, TD 2,360 ft.

Shackelford County: A. M. Housley 1 T. G. Hendrick, 5-A-AB&M, dry, TD 1,655 ft.

S. B. Roberts 4 G. R. Davis, Sec. 1, T&NO, dry, TD 1,587 ft.

Stonewall County: Continental Oil Co. 1-A Nichols, 381-D-H&TC, dry, TD 6,840 ft., Ellenburger 6,804 ft.

Taylor County: West Central Drilling Co. 1 Lillie Butchee, J. Vaughn Sur. 61, dry, TD 2,825 ft.

Wichita County: G. W. Graham 1 Prechel, BS&F Sur., A-334, dry, TD 1,986 ft.

Wilbarger County, Ted Weiner 1-C Waggoner, 52-2-H&TC, dry, TD 4,053 ft.

Frank Wood 1 W. T. Waggoner "George," 36-2-H&TC, dry, 2,479 ft.

Wise County: J. W. Pace 1 J. B. Banks, B. F. Banks Sur., dry, TD 3,511 ft.

Young County: J. M. Hawley 1 M. Foehr, TE&L Sur., 192, A-439, dry, TD 1,280 ft.

J. C. Man Jr. 1 W. R. Goldston, TE&L Sur., A-1,076 dry, TD 4,016 ft.

S & S Drilling Co. 1 C. C. Prideaux, H. F. Peters Sur., A-1,139, dry, TD 770 ft.

S & S Drilling 2 Prideaux, Peters Sur., A-1,139, dry, TD 788 ft.

Eastern Texas

Extension Due at East Gossett Field

DALLAS.—Sparta Oil Co. 1 T&NO, third test in East Gossett field of Kaufman County, had prospects of being its second producer and southwest extension. The well had pay in the Woodbine between 3,241-45 ft. and was estimated good for 80 bbl. of oil a day.

Humble Oil & Refining Co. opened the field in January with the 1 Ed Legg, and later drilled a dry hole northeast of the discovery.

Western Tarrant County was in line for a deep exploration by Hill & Hill, Rowan Oil Co. and Cities Production Corp. Proposed test is the 1 B. L. Markum, located 4 miles northwest of Benbrook in the R. Bissett Survey, A-192. Contract depth was 8,200 ft.

Humble 1 C. J. Cartwright, Travis Peak exploration west of Cayuga, (Woodbine and Glen Rose), field of Freestone County, was drilling lime and shale at 6,781 ft. Humble 1 Fred Marberry, 13,595-ft. wildcat plugged back to 7,337 ft., flowed 36 bbl. of oil and

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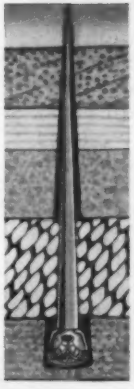

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Stanolind Oil & Gas Co. completed 1-A Harden Gas unit, Woodlawn field, Harrison County, for a daily potential of 310,000,000 cu. ft. of gas, plus a rich 72°-gravity distillate yield of 41.87 bbl. per 1,000,000 cu. ft. of gas. Rock pressure was 2,425 psi. Perforations were from 6,412-36 and 6,459-6,500 ft.

EAST TEXAS (DISTRICTS 5 AND 6) WILDCAT FAILURES

Anderson County: Johnson Cone 1 Mrs. W. Woodard, J. C. Ogden Sur., A-593, 1 mile NW Neches, dry, TD 5,301 ft.

Cherokee County: The Texas Co. 1 W. T. Whiteman, NCT-1, W. M. Carter Sur., 1½ miles S Rusk, dry, TD 10,150 ft., elev. 353 ft., James 9,085 ft.

Falls County: Humble Oil & Refining Co. 2 Emma Pieper, L. Thumer Sur., 6 miles NW Rosebud, dry, TD 2,886 ft.

Hill County: Joe A. Humphrey 1 J. F. Osborne, E. S. Cabler Sur., 1½ miles NW Covington, dry, TD 7,810 ft.

A. O. Phillips et al 1 D. N. Vosburg, Tyler CSL, 3 miles SE Penelope, dry, TD 1,189 ft.

Kaufman County: H. B. Ownsby Drilling Co. 1 W. W. Lechner, J. C. Hale Sur., 2½ miles SW Terrell, dry, TD 5,640 ft., Woodbine 2,625 ft.

Limestone County: Farris & O'Neal 1 Louis Childress, Turner Moss Sur., 4 miles E Kosse, dry, TD 6,252 ft.

Navarro County: Fletcher, Warren & McClung 1 Miller, John White Sur., A-819, dry, TD 3,230 ft.

California

Condensate Discovery Apparent in Fresno

LOS ANGELES.—Richfield Oil Corp. apparently has made a gas-condensate discovery 10 miles north of Coalinga production in Fresno County. The well, 1 Denlinger, on a formation test in the Gatchell sand at 9,243-9,308 ft. flowed at the daily rate of 9,356 M.c.f. of gas and 142 bbl. of 55°-gravity condensatte. Located in SW NE 14-17s-15e, the wildcat was drilled to 9,970 ft. before being plugged back to about 9,330 ft. The operator was running 7-in. casing at last reports.

The test is in the Turk anticline area where 6 tests have been drilled to deeper depths without success. In NE Section 15, Tide Water Associated Oil Co. drilled a dry 13,000-ft. test. About ¾ mile south of the Richfield test, in Section 23, The Texas Co. in 1940 drilled 1 S. P. to 10,116 ft. and then plugged back to 9,356 ft. where it was completed flowing 29 bbl. of fluid daily, cut 95 per cent. The wildcat later was shut in as noncommercial.

Developments in the gas areas further north included Standard Oil Co. of California preparing to start a test over ½ mile west of the gas discovery it made last June in the Parkford area of Sacramento County. It will be on its Corriea lease in 24-7n-4e, and possibly will be drilled deeper than 7,000 ft., total depth of the discovery. Standard reportedly has signed up leases on more than 27,000 acres in the vicinity of the discovery, completed for 3,717 M.c.f. of gas through a ¼-in. choke at 5,778-88 and 5,873-75 ft.

Union Oil Co. has staked a new wildcat in the Orland area of Glenn County, its 44-2

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TYPE C
For hard rock formations.

TYPE CT
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TYPE OSN
For medium non-abrasive shales.

TYPE OW
A general purpose bit for drilling in medium formation.

TYPE GYN
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TYPE CFF
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Union-Brazos-Vereschagin in 2-21n-3w. The test will be ¾ mile northeast of a 3,200-ft. dry test drilled by Union and General Petroleum Corp. in 1944. In Yolo County, Mohawk Petroleum Corp. abandoned 1 Cobb, a northerly extension test to Dunnigan Hills gas field. Total depth was 3,000 ft.

In San Joaquin Valley a test being closely followed was Richfield's southwest outpost to the Eocene discovery at Wheeler Ridge. The test, 76-29 Kern County Land, in NE SE 29-11n-20w, at a depth of 9,938 ft. had cored upper streaks of oil sand and was coring ahead for the main Eocene sand. The stepout may have been running slightly lower than the discovery, but 250 ft. of the amount is accounted for in difference of elevation.

Of the four other extension attempts under way, all were at least 3,000 ft. above the Eocene. Signal Oil & Gas Co. abandoned its 1 Signal-Intex-K. C. L about 2 miles south of the discovery. Slated to drill to about 7,000 ft. to the Miocene, the wildcat was picking up formations well below the anticipated depths. Signal reportedly is planning a second test on its holdings there.

Southeast of Mountain View production about 1 mile, in SW NE 3-31s-29e, Patrick A. Doheny completed 1 Di Giorgio as a Schist discovery. The wildcat pumped 20 bbl. of 27°-gravity crude daily from perforations at 4,842-4,921 ft.

A new wildcat getting under way in Cuyama Valley was Richfield 45-24 Russell A in 24-10n-27w, 1 mile north of South Cuyama production. South of the field, in NW NW 8-9n-26w, M. J. M. & M. Oil Co. halted drilling at 8,790 ft. at 1 Wilshire-U. S. L. to run a formation test at 8,640-8,790 ft.

CALIFORNIA SUCCESSFUL WILDCATS

Kern County, ¼-mile extension to Edison field: Superior Oil Co. 75-1 Lon V. Smith, NE SE 1-30s-28e, pumped 89 bbl. daily 19.9°-gravity crude from 4,710-4,815 ft., TD 5,016 ft., plugged back to 4,815 ft.

Santa Barbara County, new field discovery in Careaga area: Western Gulf Oil Co. 1 Careaga, NE SE 7-8n-33w, pumped 135 bbl. daily from perforations at intervals between 5,627-7,259 ft., 23.9-gravity crude, cut 34 per cent, TD 7,280 ft., elev. 815 ft.

CALIFORNIA WILDCAT FAILURES

Kern County, McKittrick area: Moriqui Exploration Co. 3 Anderson, 15-30-21e, dry, TD 4,698 ft.

Mount Poso area: Walter DeCoursey 1 "Well," 8-27s-28e, dry, Vedder 2,214 ft., TD 2,350 ft., elev. 1,264 ft.

Sharktooth area: Wood Callahan Oil Co., Ltd., et al 23-1-Southern Pacific, 23-28s-28e, dry, TD 2,635 ft., elev. 818 ft.

Tejon Hills area: Chanac Associates 2 White Oak, 7-11n-17w, dry, TD 450 ft., elev. 935 ft.

Tunis Creek area: Horace Steele 1 Reserve, 22-11n-18w, dry, bottomed in basement, TD 1,645 ft., elev. 950 ft.

Wheeler Ridge area: Signal Oil & Gas Co. 1 Signal-Intex-K. C. L., 4-10n-20w, dry, TD 5,527 ft., elev. 1,688 ft.

San Benito County, Lonoak area: Standard Oil Co. of California 53-26 Eade, 26-18s-9e, dry, TD 7,530 ft., elev. 1,695 ft.

San Luis Obispo County, Creston area: Amerada Petroleum Corp. 5-1 Creston Community, 4-28s-13e,, dry, TD 1,643 ft., elev. 1,208 ft.

Santa Barbara County, Figueroa Mountain area: Honolulu Oil Corp. 1 Efromson, 19-8n-28w, dry, TD 2,100 ft., elev. 3,110 ft.

Santa Cruz County, Watsonville area: Monterey Oil Co. 1 Porter, 25-11s-2e, dry, TD 2,985 ft., elev. 337 ft.

Stanislaus County, Salado area: Shell Oil Co. 36X-28, 28-5s-7e, dry, TD 4,993 ft., elev. 490 ft.

Texas Gulf Coast

Casing Cemented at Harris County Well

HOUSTON.—One mile northeast of the town of Fairbanks, Harris County, L. F. Oil Co. has cemented casing in 1 Charles F. Roch, Jr., 2,800 ft. northwest of the discovery well for the recently opened South Fairbanks reservoir. Operator made hole to 7,250 ft. and is preparing to perforate for completion attempt. Test is in the Joseph Hays Survey, Hahl Subdivision, Lot 4, Block "C."

Location for an immediate 8,000-ft. test as the 1 C. L. Bullock unit was announced by Amerada Petroleum Corp. 2 miles west of Fairbanks and 1,700 ft. southeast of the East Satsuma field discovery well, Harris County. Location is in the WCRR Survey, A-1185, Independence Gardens Subdivision, Block 4.

Bright and Schiff, operating from Dallas, have encountered additional shows of gas and distillate in the Luling sand of the Wilcox zone at 1 Schoelfield. Three drill-stem tests were run and they were as follows: 7,829-41

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ft., using ¼-in. chokes and 1,000 ft. water cushion, had water cushion at surface in 8½ minutes, tool open 9 minutes, working pressure of 250 psi., bottom-hole flowing pressure 2,050 psi., shut-in pressure 3,425 psi., and recovery was 691 ft. of water cushion plus 30 ft. of distillate. The second drill-stem test was run at 7,842-58 ft. in Slick sand, using ¼-in. chokes and 1,000 ft. water cushion, tool open 15 minutes, water cushion to surface in 15 minutes, working pressure 160 psi., bottom-hole flowing pressure 1,500 psi., shut-in pressure 3,400 psi., and recovery was 744 ft. of water cushion cut with amber-colored distillate. The third drill-stem test was run at 8,023-28 ft., in lower part of Luling sand, using ¼-in. chokes and 1,000 ft. water cushion, working pressure was 32 psi., and recovery was 90 ft. of oil-cut mud plus 200 ft. of salt water. It has been reported that the top of the Luling sand was 8,010 ft. and gas-distillate-water contact was 8,028 ft., giving an 18-ft. sand containing gas and distillate. Location is on the James G. Marrow Survey, A-227, Bee County.

Hickok and Reynolds Royalty Co. and W. L. Pickens of San Antonio, have completed 1 Mrs. Rudolph Martin Estate, as a gas-distillate discovery, from 70 shot perforations in the Yegua sand at 5,448-60 ft., and are waiting on the Railroad Commission potential test. Hole was bottomed at 8,850 ft. with 5½-in. casing cemented to 5,530 ft. Location is on the A. Linville Survey, A-184, 1½ miles west-southwest of Anders Townsite in Goliad County.

TEXAS GULF COAST (DISTRICTS 2 AND 3) SUCCESSFUL WILDCATS

Bee County: Newman Bros. Dr. Co., Alaska SS Co. & Calvert Corp. 1 H. G. Finke, Wm. Allen Sur., TD 5,006 ft., prod. zone Frio, perf. 4,095-106 ft., IPF 12.53 bbl. of oil per day, 10/64-in. chokes, 22.6°-gravity, gas-oil ratio 15,538:1.

Calhoun County: Western Natural Gas Co. 1 State 55, San Antonio Bay, TD 11,584 ft., prod. zone Frio, perf. 8,872-84 ft., IPF open flow 11,500,000 cu. ft. of gas per day, 15,400:1 gas-oil ratio.

Fort Bend County: J. R. Butler et al 1 John L. Barnes, I&GN RR Co. Sur., A-263, TD 8,460 ft., prod. zone Vicksburg, perf. 8,417-27 ft., IP 18,000,000 cu. ft. of gas per day on open flow, 56°-gravity oil.

TEXAS GULF COAST (DISTRICTS 2 AND 3) WILDCAT FAILURES

Brazoria County: The Texas Co. B-1 T. L. Smith Jr., A. Darst Sur., dry, TD 3,496 ft.

Calhoun County: Arkansas Fuel Oil Co. D-1 J. J. Welder et al, E. Hidalgo, A-21, dry, TD 11,011 ft.

John W. Mecom 15 Minnie S. Welder, John Piefoering Sur., dry, TD 9,010 ft.

Sun Oil Co. 80-1 San Antonio St. Tr. 80, dry, TD 11,969 ft.

Chambers County: Randerson, Carr & Scoggins 1 E. A. Wilborn, T. Fitzgerald Sur., A-99, dry, TD 7,526 ft.

Sparta Oil Co. 1 St. of Texas M-34,859, Sec. 49, Trinity-Galveston, dry, TD 9,046 ft.

Colorado County: Robert Mosbacher 1 R. L. Williams, CTRR Co. Sur. 663, A-152, dry, TD 8,665 ft.

DeWitt County: Kirkwood & Co., W. F. Seeger 1 W. N. Kuester et al, SA & MG RR Co. 10, dry, TD 8,515 ft.

Goliad County: Kirkwood & Morgan, Inc. 1 C. Kerlick, J. C. Bridgeman Sur., dry, TD 3,850 ft.

Jackson County: Gasoline Prod. Corp. 1 Rose and Sample, Jno. York Sur., dry, TD 6,288 ft.

Karnes County: Brazos Oil & Gas Co. 1 Katie Schrade, Victor Blanco Sur., dry, TD 7,276 ft.

Jake L. Hammon 1 Mrs. Ted Green, M. de J. Y. Barbo Sur., dry, TD 4,310 ft.

George W. Graham et al 1 Dittmer unit, B&B 1, dry, TD 8,220 ft.

Great Lakes Carbon Corp. 1 A. J. Luckett, Trustee, Gasper Flores Sur., dry, TD 6,622 ft.

Lavaca County: Carter & Carter 1 Kittie Clark, Sec. 8, John M. Achby, Sur. A-1, dry, TD 9,815 ft.

Live Oak County: Buzzini Drilling Co. 1 W. R. Seale, J. Poitevent 97, A-351, dry, TD 8,028 ft.

Forney & Winn & Armstrong & Horn & Texita Oil 2 Alma M. Bell, A. Parks Sur., dry, TD 6,015 ft.

Humphries & Ritchie 1 J. I. Hailey, J. W. Wilsin, Sur. A-681, dry, TD 2,290 ft.

Pagenkopf & Chenoweth 2 Schultz Live Stock Co. CCSD&RGNG A-296, dry, TD 2,205 ft.

Orange County: American Republics Corp. et al 2 Lutcher & Moore Lumber Co., I&GN RR Sur., A-115, dry, TD 9,803 ft.

J. C. Means, Jr. 1 Ben Walles, James Dyson Sur. A-8, dry, TD 9,922 ft.

Waller County: Oil Production Maintenance, Inc. 1 Lenora John, John McFarland Sur., A-46, dry, TD 3,284 ft.

Southwest Texas

New Pay Found at East Fulton Beach

CORPUS CHRISTI.—On a drill-stem test, Placid Oil Co. et al, have discovered a new pay sand at East Fulton Beach field in Aransas County, South Texas. The well, the 1 Fulton Outlot Unit 5, a confirmation well for the new field, on a drill-stem test at 7,702-77 ft. on ¼-in. choke, recovered 450 ft. of pipe line oil. Cores were taken between 7,735-45 ft., and recovery showed shaley sand and sand with very good oil odor, taste and fluorescence. Another drill-stem test was made at 7,741-45 ft. on ¼-in. choke, and recovery was 1,500 ft. of pipe line oil and 100 ft. of oil-cut mud. The well was bottomed at 7,888 ft., and present plans are to drill to 8,000 ft., run electric log, and set pipe for completion. Location is on the Wm. Carper Survey, A-47.

Renwar Oil Corp. 1 Marion Hearn, confirmation test in the newly discovered field just northeast of Turkey Creek field, failed as an oil completion in the Douglas sand discovery pay; however, the well was completed in a shallower gas sand. Drill-stem test at 5,899-5,903½ ft. on ¼-in. choke, in the discovery pay, recovered 270 ft. of mud and 2,540 ft. of salt water. Operators then plugged back the hole to the 5,321-30 ft. section, and on a drill-stem test at 5,323-55 ft. there was indicated gas production. 5½-in. casing was set at 5,380 ft. and perforations made at 5,324-27 ft. for completion; well came in with 1,780 psi. of working pressure, 60 ft. of mud and 60 ft. of water-cut distillate. Owners at present are waiting on potential. Discovery is in the BS&F 420 Survey, A-857, about 10 miles northwest of Corpus Christi in Nueces County.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) SUCCESSFUL WILDCATS

Atascosa County: Sid Katz 1 C. T. Troell, F. M. Mansfield Survey 6, TD 1,899 ft., IPP 72.8 bbl. of oil per day, 17.7°-gravity oil, prod. zone Carrizo, perf. open hole 1,897-99 ft.

Hidalgo County: Houston Oil Co.-American Republics Corp. 2 Temple W. West et al, Porcious 74, 74, 75, new discovery, TD 6,758 ft., prod. zone Frio, IP 173 bbl. of oil per day, 10/64-in. chokes, 48.7°-gravity, 682:1 gas-oil ratio.

Kenedy County: Pure Oil Co. 1 St. Tr. 285, Laguna Madre Tr. 285, TD 11,850 ft., perf. 9,463½-70½ ft., IP 9,400,000 cu. ft. of gas per day on open flow.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) WILDCAT FAILURES

Bexar County: Goggin et al 1 Watson, Dionicio Martinez Sur. 7, dry, TD 2,765 ft.

Frio County: James M. Anderson & R. L. Kirkwood 1 Joe Urban, AB&M Sur., Sec. 7, dry, TD 4,940 ft.

Gonzales County: B. Coleman Renick &

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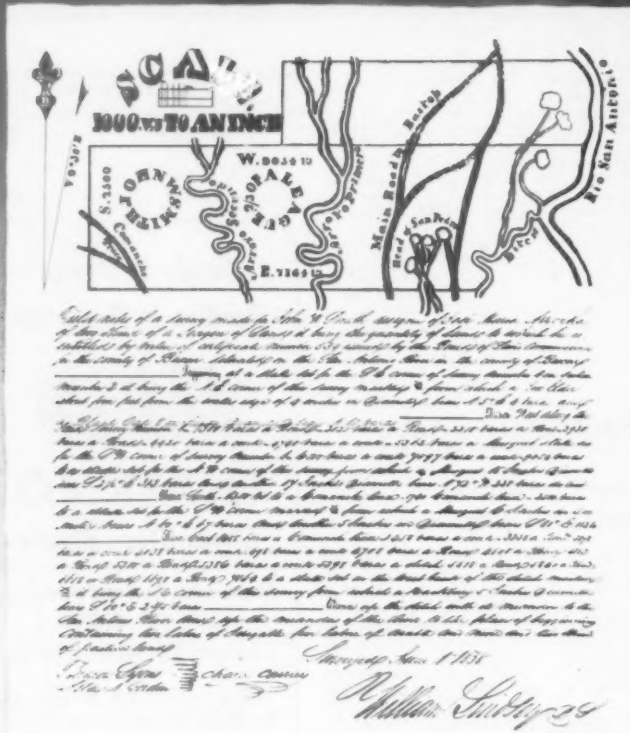

Not one dozen years ago there were many surveying things about the vara and field notes used in mapping this great land of ours. If you can see from the actual field notes of a piece of acreage, reproduced at left. Take the line shown in color, for instance: "A Black Oak 8 inches in Diameter bears N. 10 varas —"

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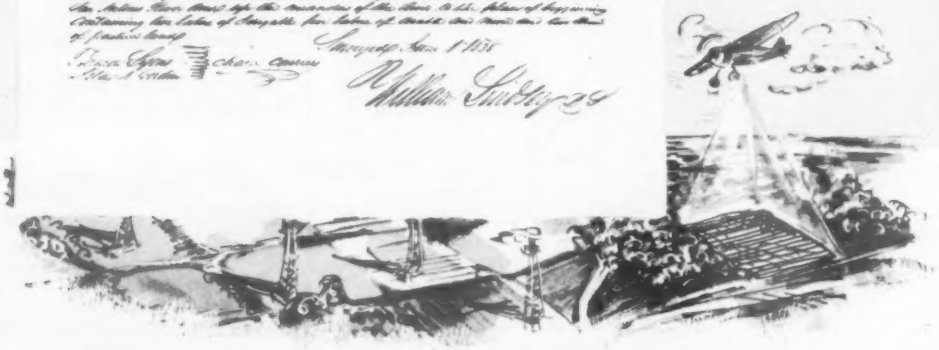

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EDGAR TOBIN AERIAL SURVEYS

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Sutton Drilling Co. 1 A. D. Purswell, Robert Kelly Sur., dry, TD 2,300 ft.

LaSalle County: Lamar Hunt Trust Est. 1 So. Texas Syn., T. Conlan Sur., Sec. 108, dry, TD 6,004 ft.

Phillips Petroleum Co. 1 LaSalle (John T. Pearson Fee) H&GN RR, Sec. 71, dry, TD 12,000 ft.

McMullen County: Holly Development Co. 1 Hays-Ezzell Ranch, Patrick Faddin Sur. A-4, Sec. 9, dry, TD 7,512 ft.

Nueces County: The Chicago Corp. & Republic Natural Gas 1-80 Chapman Ranch, El Rincon de Corpus Christi, Ramon de Hinojosa A-411, dry, TD 4,485 ft.

Val Verde County: Petrocel Corp. 1 Edna Doak Waldrop, I&GN RR Co. Sur., Sec. 27, dry, TD 2,388 ft.

Webb County: Killam & Hurd 1 A. M. Bruni Est., Calville Pasture Borrego Grant Blk. 14, dry, TD 2,695 ft.

Wilson County: H. H. Howell 1 G. N. Evans, W. N. Kirk Sur. 77, dry, TD 2,132 ft.

Appalachian-Ohio

Deep Test in West Virginia Completed

PITTSBURGH.—Portland district, Preston County, West Virginia: Cumberland & Allegheny Gas Co. completed 2-481 Archie Haught, elevation 1,862 ft., gaging 3,969,000 cu. ft. gas, chert 4,553 ft., gas 4,629 ft., and 4,681 ft., TD 4,686 ft. In Union district, Hope Natural Gas Co. 9699 D. C. Bishoff, elevation 1,892 ft., reached a depth of 5,527 ft. The Oriskany was reached at 4,966 ft., with gas at 4,976-83 ft., and 5,019 ft., testing 154,000 cu. ft. Clover district, Tucker County, Hope Natural Gas Co. wildcat 9691 Lee Spessert, elevation 2,633 ft., resulted in a dry hole, chert 6,342 ft., Oriskany sand 6,560 ft., TD 6,670 ft.

Maryland.—Garrett County: Heath completed 1 H. C. Gibson, elevation 2,414 ft., with gas gaging 107,000 cu. ft., chert 3,567 ft., gas at 3,625 ft., Oriskany sand 3,686 ft., TD 4,044 ft. Eagle Oil & Gas Co. 1 John Lohrer, elevation 2,434 ft., recorded the chert at 3,156 ft., with a show of gas at 3,166 ft., and is drilling at 3,236 ft. Cumberland & Allegheny Gas Co. 1 Noah Shrock, elevation 2,465 ft., reached the Onondaga at 4,407 ft., and is drilling at 4,425 ft. No. 1 Walter Beckman topped the chert at 3,128 ft., gas 3,151-90 ft., 260,000 cu. ft., Oriskany sand 3,210 ft., drilling 3,228 ft.

Pennsylvania.—Unity Township, Westmoreland County, Southwest Pennsylvania: Peoples Natural Gas Co. 4003 A. J. Dotterway, is drilling 8,010 ft. No. 4008 J. R. Frola, is drilling at 4,295 ft.

MARYLAND SUCCESSFUL WILDCAT

Garrett County: Heath 1 H. C. Gibson, elevation 2,414 ft., 107 M.f.c. of gas from chert, TD 4,044 ft.

WEST VIRGINIA WILDCAT FAILURE

Tucker County, Clover district: Hope Natural Gas Co. 9681 Lee Spessert, elevation 2,633 ft., dry, chert 6,342 ft. TD 6,670 ft.

OHIO

Preston Oil Co. has discovered a new oil pool or a 1½-mile east extension to New Castle pool in New Castle Township, Coshocton County. The test, 1 Ethel Reese, Lot 22, Section 11, had Clinton sand at 3,325-80 ft., with a fair showing of oil. After shooting with 110 qts., 77 bbl. was swabbed out in 24 hours.

Waverly Oil Works completed two nice wells south of Hanover in Hanover Township, Licking County. The 5 Cartnal Bros., a 1¼-mile southwest extension, had Clinton at 2,670-2,702 ft., which after on 80-qt. shot, flowed 60 bbl. and swabbed 20 bbl. during the first 24 hours. The 3 A. W. Howell, Lot 15, with Clinton sand at 2,755-92 ft., was shot with 90 qts. The first 24 hours after shot the well flowed 55 bbl. with 450,000 cu. ft. gas.

OHIO SUCCESSFUL WILDCAT

Coshocton County, New Castle Township: Preston Oil Co. 1 E. M. Reese, Sec. 11, Clinton 3,325-80 ft., 77 bbl., TD 3,395 ft.

OHIO WILDCAT FAILURE

Washington County, Barlow Township: Clark Talbot et al 1 H. F. Tretchell, Sec. 18, Oriskany, 4,080-4,108 ft., TD 4,129 ft.

Rocky Mountain

Mesaverde Oil Tested At Wyoming Wildcat

DENVER.—Stanolind Oil & Gas Co. has tested apparently commercial oil in the Mesaverde sand of Upper Cretaceous age at 1 Unit, SW NE NE 10-12n-103w, on the Middle Mountain unit, Sweetwater County, Wyoming.

The well is 20 miles east of production in the Hiawatha area which produces from Lance and Wasatch formations of Tertiary age. Test of the Mesaverde from 6,532-54 ft. in the Stanolind wildcat recovered 1,400 ft. of free oil and 400 ft. of water in 2 hours. The operator is reported coring below 6,574 ft.

There has been no previous production in Mesaverde in the general area, with the exception of a small gas producer completed by Amerada Petroleum Co. in the Dry Creek area of Carbon County east of the present discovery about a year ago. The formation is not of primary importance in any present producing areas of the Rockies, with the exception of the San Juan basin in northern New Mexico. However commercial production from the formation was discovered by Stanolind in Beaver Creek field, Fremont County, Wyoming in 1951, with subsequent commercial development. Mesaverde also produces at West Poison Spider in Natrona County, but is considered only semi-commercial due to the depths at which it is encountered.

Renewed interest is forecast for the Green River and Washakie basins as a result of the discovery. Current leasing is indicative of this prospect. Colorado residents this week leased an almost solid area covering 50,000 acres in Moffat and Routt counties, Colorado, southeast of the discovery. Carter Oil Co. has started a Mesaverde test in the general Craig area of Moffat County, the fourth wildcat for the company in the area since 1947. The new location is 1 Government SW SE SE 18-7n-91w. Previous efforts were all nonproductive.

Two wildcats in the central portion of the Williston basin which will test a large area as yet undrilled in the current Williston basin play were announced during the week. The first wildcat for Sheridan County, Montana was announced by S. L. Shepherd, Dallas and Deardorf Oil Co. of Houston. The wildcat is 1 Fee, C NW SE 13-35n-55e, planned as a Devonian test. Thirty-seven miles to the south, in Roosevelt County, Deep Rock Oil Corp. will drill 1 Picard, C NW NE 6-30n-58e, just west of the North Dakota state line. Both these tests are in an area which is more or less centrally located in the Williston basin, and which has not been drilled in the current play.

Elsewhere in Montana and North Dakota important wildcat locations were announced. In the Blood Creek Syncline area Continental Oil Co. has staked its first wildcat in Montana in several years at the 1 Government, C SE NE 17-23n-25e, southern Phillips County. L. S. Youngblood of Oklahoma City has made location for a 5,500-ft. Devonian test in 1 Shannon Cross, SW SW NW 7-16n-22e, in the Ford Creek area of Fergus County. This is reported as one of a series of wildcats on land farmed out from Continental.

In North Dakota, Deep Rock located for 1 Johnson "A," C SW SW 30-139n-86w a Devonian test in the Church area, Morton County.

The Texas Co. has cored additional Ordovician saturation at its apparent Cedar Creek, Dawson County, Montana discovery, and test additional oil and gas-cut mud with some salt water at the 1 NP G (NCT 4) C SW SW 23-17n-53e, 4 miles north of the discovery in the field.

Shell Oil Co. has released additional tests of its two most recent significant completions in Montana. The company's 42-24 Berry, Richey area extension is flowing 435 bbl. of oil daily through 9/64-in. choke. Potential of 5,375 bbl. daily was announced by Shell on open flow tests of 5 hours duration. At Little Beaver, in Fallon County the company's 1 Little Beaver, C NE SW 13-4n-61e is pumping a top of 324 bbl. of fluid daily, of which 293 bbl. is oil, with testing to continue.

In the Beaver Lodge-Tioga area, North Dakota. Amerada Petroleum Corp. completed three new producers bringing the total in the state to 32. The 1 Ramberg, in Section 5-155n-95w, ½-mile east extension of Beaver Lodge field flowed 22 bbl. of oil per hour from Madison through ¼-in. choke. At Tioga 1 McGuiness C SW NE 12-157n-95w, gaged 9 bbl. per hour through 12/64-in. choke. The 1 Borstad, C NE SE 11-157n-95w, ½-mile north of the Tioga discovery gaged 215 bbl. per day on completion.

In Logan County, Colorado, F. Kirk Johnson and Dunn & Boreing et al have tested gas at the rate of 6,000 M.c.f. from each of two "J" sand zones at 1 State, SE SE NE 16-8n-50e. The wildcat is 12 miles east of Sterling, and marks the first production south of the South Platte River, in Logan County. Test of the interval 4,667-76 ft. had gas at the rate of four to six million cubic feet per day with flowing pressure 900-1,050 psi. From the interval 4,676-84 ft. the estimated flow was 6 million cubic feet per day. The operator is coring ahead. The wildcat is located on a block farmed out to Dunn & Boreing by Deep Rock Oil.

COLORADO WILDCAT FAILURES

Logan County: Blackwood & Nichols 1-24 State, SW SW NW 24-6n-52w, dry, TD 5,117 ft. Morrison 5,062 ft.

McDermott & Barnhart 1 B. J. Monroe, SE SW NE 11-7n-50w, dry, TD 4,740 ft. "M" sand 4,685 ft.

Moffat County: Jack Herley Operations, NW NW NW 36-5n-104w, dry, TD 1,720 ft. Weber 1,540 ft.

Weld County: McDannald Oil Co. 1 Peter Zimbleman, NE NE NW 23-2n-63w, dry, TD 7,313 ft. "J" sand 7,070 ft.

E. K. Carey 1 State, NW NW NW 36-

9n-56w, dry, TD 6,025 ft. Morrison 5,966 ft.

WYOMING SUCCESSFUL WILDCAT

Fremont County: Sinclair Oil & Gas Co. 10 "C" Unit, SE SE SW 4-28n-93w, flowed 1,536 bbl. of oil per day from Dakota, TD 6,912 ft. PBTD 4,645 ft.

WYOMING WILDCAT FAILURES

Albany County: Crusader Corp. et al 1 Templin, SW SW SW 3-21n-75w, dry, TD 1,318 ft. Tensleep 1,150 ft.

Fremont County: Seaboard Oil Co. and Superior Oil Co. 2 Unit, NE SE SW 10-31n-98w, dry, 8D 1,903 ft. Dinwoody 1,804 ft.

UTAH WILDCAT FAILURES

Millard County: Gulf Oil Corp. et al 1 Unit, NW SW 8-16s-17w, dry, TD 9,050 ft. Laketown 8,956 ft.

MONTANA WILDCAT FAILURES

Big Horn County: George J. Greer, Trustee 1 Kendrick, SE SE SW 34-1n-34e, dry, TD 2,700 ft. Morrison 2,440 ft.

Blaine County: Montex Oil & Gas Corp. 1 Sam and Marie Unruh, C SW SE 33-36n-19e, dry, TD 4,158 ft. Sawtooth 4,093 ft.

Carbon County: Mule Creek Oil Co. 1 Melcher, C NW SE 30-9s-25e, dry, TD 5,528 ft. Madison 5,418 ft.

Fergus County: B&L Drilling Co. 1 N-Bar Ranch, C NE SW 9-12n-23e, dry, TD 1,650 ft. Otter 1,640 ft.

Hill County: General Petroleum Corp. 36-12-P Erickson, SW NE SW 12-36n-15e, dry, TD 6,312 ft. Cambrian 6,287 ft.

Liberty County: Montana-Dakota Utilities 602 Frazer, SE SW NW 30-36n-6e, dry, TD 3,044 ft. Sawtooth 2,825 ft., Madison 2,922 ft.

Roosevelt County: Deep Rock Oil Corp. 1 Werner, C NW SE 8-27n-50e, dry, TD 6,534 ft. Charles 5,514 ft.

NORTH DAKOTA WILDCAT FAILURES

Barnes County: S. D. Johnson 1 A. C. Thorkelson, C SW SW 35-141n-61w, dry, TD 1,671 ft.

McLean County: Stanolind Oil & Gas Co. 1, C SW SW 28-150n-80w, dry, TD 8,900 ft. Cambrian 8,865 ft.

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Canadian Fields

Oil Found At Arville Wildcat

CALGARY.—Bailey Selburn Oil & Gas, Ltd., and associates have discovered some oil, plus water, at their wildcat in the Arvilla area of central Alberta that discovered a sizable flow of natural gas during mid-July in the Lower Cretaceous. The new oil find came in the D1 zone of Devonian, on a 6-section farmout tract from Western Leaseholds Ltd.

The discovery well, Bailey-Western 16-3 Arvilla, on LSD 16, 3-58-1w5, 33 miles northwest of Edmonton, ran D1 drill-stem test from 3,994-4,014 ft. and recovered 210 ft. of crude oil and 1,500 ft. of salt water. Gravity of the oil has not as yet been checked, but it appeared to be heavy. Company officials stated that several additional drill-stem tests had been run in a 60-ft. porous section that showed oil staining, and recoveries were heavily oil-cut mud. Crew is now reaming, preparatory to drilling ahead for Lower Devonian objectives. Hole will go down in search of a D3 coral reef prior to plugging back for production tests in the D1.

The gas discovery at 16-3 Arvilla came when crew encountered a Cretaceous porous section from 3,169-74 ft. The well blew wild for about 8 hours, at rate estimated at 10,000,000 cu. ft. daily, before being brought under control.

Bralsaman Petroleum, Ltd., Vancouver independent, has discovered crude oil at a wildcat in south Taber area, on farmout lands acquired from Anglo Canadian Oil Co., Ltd., and Canadian Western Natural Gas Co., Ltd. The new strike gave medium gravity oil which rated 24½°, and came from a sand formation below 3,182 ft.

The discovery well, Bralsman 1 Taber, on LSD 6, 19-8-15w4, is about 8½ miles southwest of Taber field oil wells, 33 miles east of Lethbridge and 130 miles southeast of Calgary. One-hour drill-stem test from 3,182-94 ft. gave up 1,410 ft. of oil and 30 ft. of mud. Crew is now running electrolog preliminary to setting string of production casing.

Indications of a third oil discovery in the Vulcan area of southern Alberta were reported this week, when the team of Husky Oil & Refining, Ltd., and Phillips Petroleum Co. found light gravity oil in the Mississippian formation at their joint wildcat 6 miles south of Vulcan town. During July that well had discovered 35°-gravity crude oil in the Basal Cretaceous.

The indicated dual discovery well is Husky-Phillips 1 Vulcan, on LSD 8, 13-16-24w4, 60 miles south of Calgary, 23 miles north of Barons oil field and 13 miles east-southeast of the 1 Shell-C. and E. Madison oil discovery.

The Husky-Phillips well contacted the Mississippian at 5,491 ft., or 2,077 ft. subsea, and ran first drill-stem test in that formation from 5,491-5,503 ft. Natural gas flowed to

surface in 14 minutes, at estimated rate of 25,000 cu. ft. daily. Recovery during the 2-hour test consisted of 220 ft. of 30°-gravity crude oil, 50 ft. of oil-cut mud and 30 ft. of slightly brackish water. Second test, from 5,503-15 ft., yielded 90 ft. of oil-cut mud in 45 minutes. Drilling is continuing.

Texaco Exploration Co.'s exploratory driller in the Pigeon Lake region, about 35 miles southwest of Edmonton, has struck a sizable flow of wet gas from the D3 zone of Devonian. During July this well also found some oil in the D2, and is the second Pigeon well to strike wet gas in D3. The Gulf-C. P. R. 4 Fiveland discovery, 6¼ miles to the southwest found wet gas and oil in D3, while mid-way between the Fiveland and Texaco wells, a joint Stanolind-California Standard driller found a 2,000,000 cu. ft. per day gas flow rate from the Viking and is now heading for lower objectives.

Texaco A-1 Pigeon Lake, on LSD 14, 36-46-28w4, contacted D3 at 6,670 ft. or 3,704 ft. subsea, about 203 ft. higher than the Fiveland well and 128 ft. lower than the Bonnie Glen wet gas and oil discovery well some 3 miles to the northeast. Some 220 ft. of D3 zone has so far been penetrated, and wet flow rates in excess of 4,000,000 cu. ft. per day have been recorded. Last test, at bottom 6,895 ft. gave a gas flow in 1 minute at rate 3,750,000 cu. ft. daily, a spray of naphtha in 16 minutes and recovery of 10 ft. naphtha.

CANADIAN WILDCAT FAILURES

Ranchmen's - Homestead - Seaboard 1 Arrowwood LSD 1, 19-19-24w4, TD 8,600 ft.

Anglo 1 Sunnynook, LSD 2, 31-26-12w4, TD 4,375 ft.

Phil 1 Branch, LSD 13, 9-90-4w6, TD 3,737 ft.

Sun 4-22 Hammerhill, LSD 4, 22-23-23w4, TD 7,265 ft.

Kansas

Pawnee County Wildcat Shows Oil in Arbuckle

MUSGROVE PETROLEUM CO. has an indicated oil-discovery well in Arbuckle lime at its 1 Phinney, located in the SW SW NE 34-21-16, ½ mile east of Larned, in eastern Pawnee County on the western edge of the Central Kansas Uplift trend of development. The prospective well had good saturation in Arbuckle lime, topped at 3,847 ft., and, in a 60-minute drill-stem test with bottom of the hole at 3,849 ft., filled 3,360 ft. with clean oil. Flow pressures ranged from 1,180 to 520 psi. with bottom-hole pressure of 1,270 psi. Operators have cemented their oil string at 3,848 ft. Nearest production is in the Evers pool, 1½ miles to the east.

A southern Ellis County wildcat also has given indications of production in Lansing lime. It is Petroleum, Inc., 1-B Wilson, located in the SE NE NE 1-15-19, where a 60-minute drill-stem test at 3,329-60 ft. in the upper part of the section, got 2,060 ft. of oil and 940 ft. of salt water with a substantial showing of gas and bottom-hole pressure of 1,060 ft. Hole is being deepened to the Arbuckle. Location is about ½ mile north of the Deschant pool and about the same distance east of the San Antonio Townsite pool with the Lookout Hollow pool about a mile to the northeast.

In the western part of the same county, Imperial Drilling Co.'s Raynesford wildcat, SW SW NW 17-13-20, averaged 9 bbl. of oil per hour for 16 hours by swabbing while testing the conglomerate zone in open hole at 3,871-85 ft. Top of zone is 3,837 ft. Location is 3 miles north of the Irvin North pool, nearest production.

Petroleum, Inc., is preparing to test promising oil showings encountered in Lansing-Kansas City lime at its 1-A Tucker, SW SE NE 28-20-13, southern Barton County wildcat. Most promising showings are in an interval at 3,408-30 ft., where a 60-minute drill-stem test recovered 240 ft. of free oil and 420 ft. of heavily gas-cut oil. Top of the Lansing was given as 3,262 ft. Arbuckle lime, topped at 3,624 ft. and drilled to 3,628 ft., did not show for production. Location is 1½ miles northeast of the Hiss Southeast pool and about 2 miles northwest of the Rolling Green pool.

KANSAS SUCCESSFUL WILDCATS

Stafford County: Jackson Drilling Co. 1 Crissman, NE NE SW 16-23s-14w, 202 bbl. of oil from Lansing-Kansas City 3,664-68 ft., TD 4,083 ft.

M. B. Armer-Phillips 1 Walter, SW SE SW 36-25s-13w, 81 bbl. of oil from Lansing-Kansas City 3,822-28 ft., TD 4,346 ft.

KANSAS WILDCAT FAILURES

Clark County: Stanolind Oil & Gas Co. 1 Perry, C SW NE 33-32s-22w, dry, TD 5,664 ft.

Cowley County: E. F. Wakefield 1 Morris, SE SE SE 33-33s-4e, dry, TD 3,285 ft.

Decatur County: Lohman & Johnson 1 Johnson, NW NW SW 10-5s-28w, dry, TD 4,509 ft.

Ellis County: Flournoy & Hastin 1 Urban, NW NW SW 11-15s-19w, dry, TD 3,740 ft.

Graham County: H. Gore-Vernon Oil & Gas

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Co. 1 Goddard, SE SE NW 22-9s-23w, dry, TD 4,296 ft.

Jones, Shelburne & Farmer 1 McClellan "B," SE SE NE 7-10s-21w, dry, TD 3,985 ft.

McPherson County: Sohio 1 Kumli, SW SW SE 20-18s-4w, dry, TD 3,808 ft.

Morton County: Colorado Interstate 1 Hayward, C S½ SE 9-32s-42w, dry, TD 5,342 ft.

Norton County: The Texas Co. 1 Gleason, SE SE NE 7-4s-24w, dry, TD 3,950 ft.

Pawnee County: Flynn Oil Co. 1 Michael, SW SW SW 10-22s-16w, dry, TD 4,043 ft.

Pratt County: Cities Service 1 Lynce "N," SW SW NE 6-29s-11w, dry, TD 4,650 ft.

Reno County: Derby-Stickle Drilling Co. 1 House, NW NW NW 7-25s-4w, dry, TD 3,990 ft.

Rooks County: B&R 1 Whisman, NE NE SW 25-8s-20w, dry, TD 3,575 ft.

H. Gore 1 Morris, NW NW NW 16-9s-20w, dry, TD 3,778 ft.

Rush County: Heathman 1 Campbell, NE NE NE 21-16s-20w, dry, TD 4,028 ft.

Saline County: Atlantic 1 Hoeffner, SW SW SE 2-14s-2w, dry, TD 3,387 ft.

Stafford County: Grant 1 Meyer, SW NE NW 6-21s-12w, dry, TD 3,540 ft.

M. B. Armer 1 Reed, SW SW SE 12-23s-11w, dry, TD 3,785 ft.

Sumner County: H. M. Williams et al 1 LaForce, SE NW NW 9-30s-1w, dry, TD 3,851 ft.

Trego County: Mid-Continent Petroleum Corp. 1 Marquand, NW NW NW 19-12s-21w, dry, TD 4,034 ft.

EASTERN NEBRASKA WILDCAT FAILURE

Richardson County: Stout Drilling Co. 1 Hoffman, SW SW NW 12-1n-14e, dry, TD 2,223 ft.

MISSOURI SUCCESSFUL WILDCAT

Clinton County: Fell et al 1 Stanton, SE SW NE 21-56n-30w, 90 M.c.f. of gas, TD 425 ft.

MISSOURI WILDCAT FAILURE

Perry County: Fred Fischer 1 Huber, 14-36n-11e, dry, TD 1,943 ft.

Central Area

ILLINOIS

J. W. McGuire and A. E. Vandenbark are opening a new Aux Vases producing area in eastern Gallatin County where their 1 Lodsdon, located in the NE NW NW 23-9s-10e, is testing saturation logged at 2,660-70 ft. Initial swabbing tests before acidizing or shooting produced at the rate of 3 bbl. of oil per hour. Since then, the pay has been shot with 30 quarts, and hole at latest report was being cleaned out for further tests. Location is about 3 miles northeast of Shawneetown and about the same distance from nearest production, being about midway between the North Shawneetown pool to the northwest and the Raleigh pool, across the Ohio River in Union County, Kentucky. Pay is in open hole below 2,656 ft.

Calvert Drilling, Inc., and Aro Equipment Co. also have a new discovery in the same county where their 1 Henderson, NW SW NW 27-8s-9e, 3 miles east of Ridgway and ¾ mile south of production in the Inman West production, got a good showing of gas and recovered 158 ft. of oil in a 90-minute drill-stem test at 2,474-2,504 ft. in Cypress sand. Gas was at the top in 65 minutes. Hole has been deepened to 2,511 ft. and casing run to 2,476 ft. for completion. Cores below the interval tested carried oil saturation but the sand was tight.

In Richland County, Bell Brothers have run casing to test McClosky lime saturation found in their 1 Young, a wildcat located east of the Dundas field in the area 7 miles north of Olney. Spot location is in the SE SE NW 33-5n-10e. McClosky was logged at 2,905-11 ft. A 60-minute drill-stem test of the zone, taking in an interval at 2,899-2,914 ft., got gas in 7 minutes and filled 2,000 ft. of clean oil and 30 ft. of oil-cut mud with bottom-hole pressure of 775 psi. Bottom of the casing is 2,899 ft.

Aubrey & Tennant 1 Anderson, SW NE NE 26-1s-5e, a wildcat ½ mile from production in the Kennville are, western Wayne County, recovered 900 ft. of clean oil and 30 ft. of oil-cut mud in a 90-minute drill-stem test at 3,168-88 ft. in McClosky lime. Oil string has been run to the top of the pay for completion. In the test, gas showed within 8 minutes. Bottom-hole pressure was 400 psi.

INDIANA

Discovery of a new O'Hara lime pool, located 5½ miles east of Fort Branch and 8 miles southeast of Princeton, in the south central part of Gibson County, is indicated by oil and gas showings encountered by George & Wrather and Aubrey & Tennant at their 1 Anslinger, NW SE NW 13-3s-10w. Log indicated pay at 2,025-29 ft., a 60-minute drill-stem test, taking in the interval from 2,017 to 2,031 ft. got 1,600 ft. of gas, 240 ft. of oil, and 180 ft. of mud-cut oil with bottom-hole pressure of 700 psi. Total depth is 2,150 ft. with casing run through the pay to 2,095 ft. The area is more than 2 miles from other production, being east of the Fort Branch East pool and southwest of the Francisco South pool.

Production in the area 4 miles northeast of Princeton, same county, is being widened by a three-location step-out made by Francis Beard at his 1 Kolb, located in Fractional Section 21-1s-10w. The well swabbed at the rate of 17 bbl. of oil per hour natural in initial tests of saturation found in the Aux Vases zone at 1,818-25 ft. Hole is open below 1,800 ft.

MICHIGAN

First pump tests were encouraging at James J. McGerry, Trustee & McClure Oil Co. 1 Emorey, SE NW SE 10-10n-12w, Tyrone Township wildcat, Kent County. This wildcat, a possible Traverse oil discovery well, was reported to have pumped 15 bbl. of oil and 10 bbl. of water in 3 hours, on one test, and after pumping stroke was changed, well pumped 32 bbl. of oil and 24 bbl. of water in 19 hours. Wildcat logged Traverse lime at 2,376 ft. Hole was bottomed out at 2,383 ft., but was plugged back to 2,380 ft. and then cleaned out to 2,382 ft. prior to these natural pump-tests. It appeared that oil and water came in together, but some water was shut off by the plug-back.

Sun Oil Co. added the sixth Marshall gas producer in North Hamilton field, Clare County, this week at the 1 Frodey-Woods et al Gas unit, C NE 1-19n-4w, Hayes Township. This well was gaged good for 8,080,000 cu. ft. of gas a day at 1,555 ft., total depth. Top of Marshall was logged at 1,541 ft. Gages increased with every foot of drilling in the Marshall, from 1,541-52 ft.

ILLINOIS WILDCAT FAILURES

Alexander County: Vick Oil Co. 1 Smith, NW NW NW 15-17s-2w, dry, TD 1,847 ft.

Clark County: G. W. Knowles 1 Stoelting, SW NW SE 11-11n-11w, dry, TD 2,380 ft.

Clay County: J. and G. Brown 1 Reynolds, SE SE NW 7-5n-5e, dry, TD 2,585 ft.

Clinton County: T. M. Conray 1 Essenpreis, SW SW SE 4-3n-4w, dry, TD 2,331 ft.

Gallatin County: G. F. Reasor 1 Henry, SE NE NW 21-9s-10e, dry, TD 2,900 ft.

Hamilton County: Deep Rock Oil Corp. 1-A Neil, SW NW NE 11-6s-7e, dry, TD 3,490 ft.

Jefferson County: C. E. Brehm 1 Harlow, SE SW NW 11-2s-3w, dry, TD 2,905 ft.

Johnson County: T. G. Glass 1 Cummins, SW SW SW 25-13s-4e, dry, TD 1,010 ft.

Marion County: Pure Oil Co. 1 Switzer, SE NW SE 1-4n-4e, dry, TD 2,725 ft.

Montgomery County: Sun Oil Co. 1 Fitzgerald, NE NE SW 2-10n-5w, dry, TD 1,979 ft.

Randolph County: George & Wrather 1 Bauer Brothers, NE NE SW 8-4s-5w, dry, TD 2,325 ft.

M. L. Van Fossan 1 Fulton, NE SE NW 5-5s-5w, dry, TD 2,315 ft.

Washington County: M. Mazzerino 1 Jablonski, NE SE SW 16-3s-1w, dry, TD 1,430 ft.

Wayne County: Robinson & Puckett 1 Williamson, NE SW NE 13-2s-5e, dry, TD 3,284 ft.

White County: A. J. Slagter 1 Pyle, NE SW SE 13-5s-8e, dry, TD 3,275 ft.

Noah Petroleum Co. 1 Roser, SW SW SW 30-5s-11e, dry, TD 3,079 ft.

George & Wrather 1 Williams, NW NW NE 20-5s-8e, dry, TD 3,555 ft.

INDIANA WILDCAT FAILURES

Gibson County: Boling - Levine - Yabrove 1 Ford, SW NE SW 13-1s-10w, dry, TD 1,794 ft.

Maynard Rogers 1 Dunigan-Koll, N½ NE NE SW 14-2s-12w, dry, TD 2,476 ft.

Knox County: F. Lyons 1 Griffith, SW NW SW 14-2n-10w, dry, TD 1,397 ft.

Posey County: Ashland Oil & Refining Co. and others 1 Wade-Rowe, NW NW NE 36-5s-13w, dry, TD 2,900 ft.

Spencer County: Cline & Lambert 1 St. Meinard, SW NE SW 13-4s-4w, dry, TD 715 ft.

Sullivan County: B. L. Filingame 1 Hopper, SW NE NE 20-7n-10w, junked hole, TD 590 ft.

F. B. Cline 1 Burke-Graham, SE NW SE 36-8n-11w, dry, TD 907 ft.

F. B. Cline 1 Krauss, SW NE NE 8-8n-10w, dry, TD 1,625 ft.

WESTERN KENTUCKY WILDCAT FAILURES

Daviess County: C. Morburger et al 1 Ebelhar, NL NE SW NW NE 21-P-27, dry, TD 1,626 ft.

W. Chenault and Basin Drilling Co. 1 Cauley, N½ SE NE NW 19-026, dry, TD 2,376 ft.

Henderson County: W. F. Lacy 1 Pentecost, NE NW NE 15-O-24, dry, TD 2,662 ft.

McLean County: P. J. Lebold et al 1 Durbin, W½ NW NW SW 2-L-27, dry, TD 846 ft.

Union County: R. Mitchell 1 Springer, NW SE NE 16-N-21, dry, TD 1,372 ft.

Webster County: R. E. Hupp et al 1 Gates, E½ SE SW SE 2-M-24, dry, TD 2,725 ft.

MICHIGAN SUCCESSFUL WILDCAT

Allegan County, Trowbridge Township: Marion Creech 1 Bentley, SE SE NE 9-

1n-13w, Traverse 1,391 ft., 5 bbl. TD 1,396 ft.

MICHIGAN WILDCAT FAILURE

Van Buren County, Geneva Township: Norman L. Stevens 1 Copenhaver, E½ SE NE 33-1s-16w, Traverse 1,033 ft., dry, TD 1,050 ft.

Oklahoma

Deep McClain Wildcat Tests More Pay Zone

ADDITIONAL potentially productive pay zone has been found by Sinclair Oil & Gas Co. in its 1 Community-Willie Smith, deep wildcat test located in the C SW NW 17-5n-4w, 2 miles northwest of the North Lindsay field, in southern McClain County. Pay, in the Bromide section, first was reported at 11,008-044 ft., where in a drill-stem test the well flowed gas estimated at 1,030,000 cu. ft. per day and filled 360 ft. of 50.6°-gravity distillate and 1,000 ft. of distillate and mud-cut cushion water. Since then, with hole deepened to 11,078 ft., another test has been made with more promising results.

The latest reported test, taking in that part of the zone below 11,048 ft., flowed gas, estimated initially at the rate of 4,650,000 cu. ft. per day, and oil at the rate of 5 bbl. per hour. Gas was at the surface in 22 minutes and oil in 43 minutes. Gas flow at the end of the test, lasting 90 minutes, had dropped to a rate estimated at 2,800,000 cu. ft. per day. Final recovery was 950 ft. of 47°-gravity oil and 50 ft. of oil and gas-cut mud. Flow pressure ranged from 1,880 to 1,205 psi. Shut-in bottom-hole pressure was 2,240 psi.

Production of the deep Chitwood field, Grady County, is being widened to the south by a well which promises to be one of the best yet completed in the general area. The well is Pure Oil Co. and Kidd Williams 1 Thompson Unit, NE NE NW 10-4n-6w, which, from the Boatright sand in open hole at 12,340-416 ft. (total depth), flowed 840 bbl. of 39.7°-gravity oil in 22 hours with gas at the rate of 1,300,000 cu. ft. per day. Production the first 4 hours was through ¼-in. choke, and the last 18 hours through ⅜-in. choke. The well also is a potential producer from the shallow Cunningham sand, which operators now are preparing to test through casing perforations at 11,082-160 ft.

Lower Simpson sands, objectives of renewed development in the old Moore field, Cleveland County, are proving productive in two more wells in that field. Anderson-Prichard Oil Co. 1 Ambruster, on the west side of the field in the C NE NE 28-10n-2w, flowed 51.6 bbl. of oil in 2½ hours and recovered 5,200 ft. of oil in an initial packer test in Oil Creek sand, opposite which casing is perforated at 7,960-64 ft. Operators now are preparing to test McLish sand, opposite which casing is perforated at 7,754-56 ft.

North of the Ambruster well in the NE SE SE 21-10n-2w, Sinclair Oil & Gas Co. is making a dual zone producer at its 6-B Franklin. Testing the deeper Oil Creek sand, perforated at 7,906-17 ft., the well swabbed 137 bbl. of oil in 18 hours. From McLish sand perforations at 7,736-42 ft., the well flowed 20 bbl. in two hours.

Sterling Oil Co. of Oklahoma has added two good wells in the new East Edmond

(Continued on page 213)

Here's the quick, easy, positive way to "free" your tubing from packers and other devices that sometimes freeze in the well after long periods of use. **Just install a . . .**

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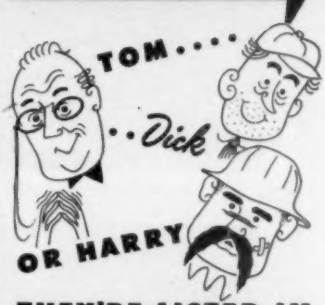

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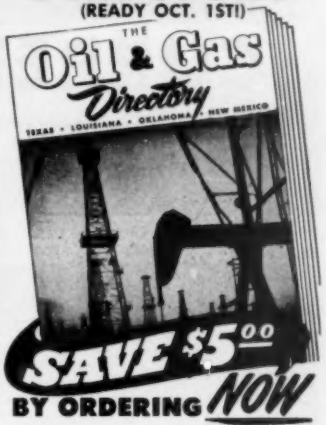

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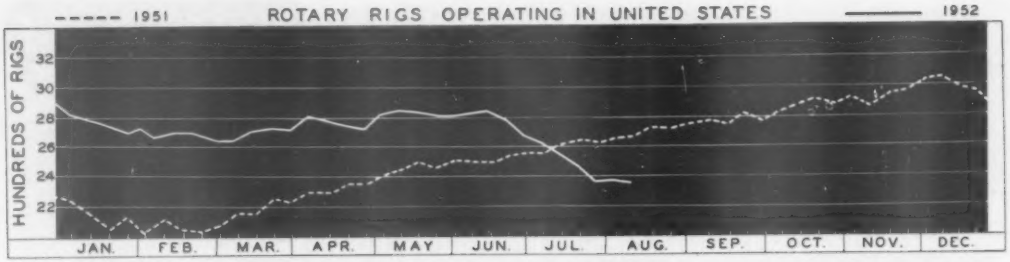
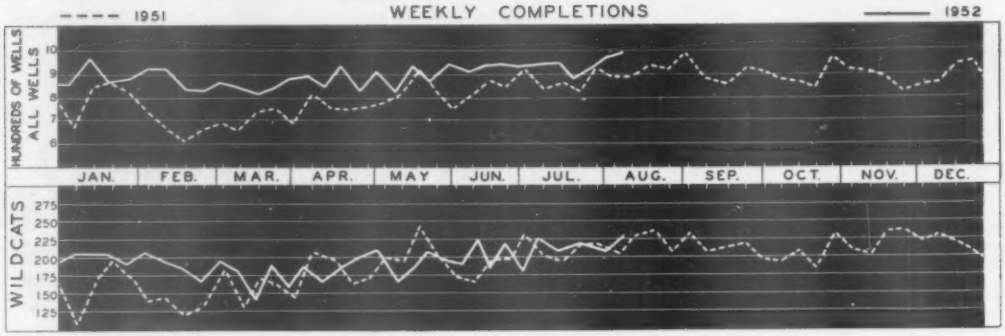




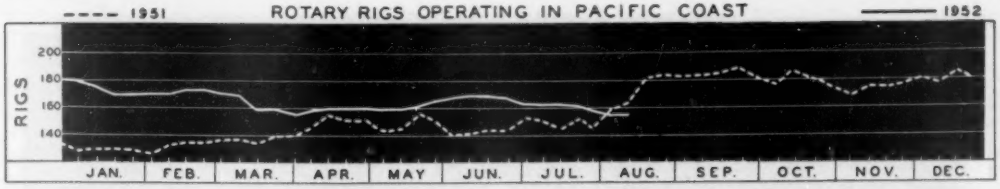
CURRENT STATISTICS

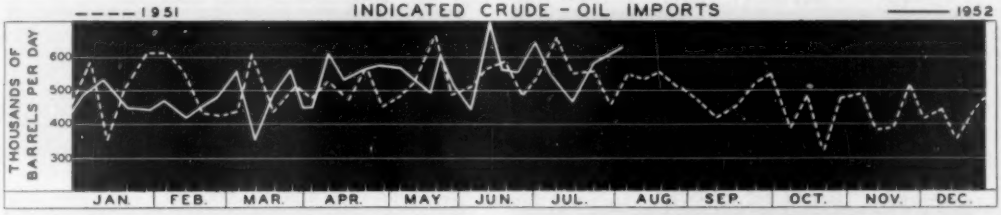
EXPLORATION

WEEKLY WELL COMPLETIONS . . . WEEK ENDED AUGUST 9, 1952

	Total of all wells					Aug. 9		Wildcat completions and discoveries					Cumulative total, 1952				
	Comp.	Oil	Gas	Dry	Footage	1952	1951	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	18	9	0	*9	26,375	452	374	0	0	0	0	0	0	0	0	2	2
Pennsylvania	47	21	5	†21	86,200	1,143	979	0	0	0	0	0	0	0	0	2	2
West Virginia	7	0	5	2	25,576	380	349	0	0	0	1	1	0	0	2	4	6
Ohio	19	8	2	9	42,137	604	560	1	0	0	1	2	2	0	7	14	23
Indiana	33	8	1	24	54,978	749	714	0	0	0	8	8	22	0	2	210	234
Kentucky	20	7	0	13	39,186	781	690	0	0	0	6	6	15	0	1	146	162
Illinois	54	19	2	33	134,029	1,139	1,405	0	0	0	17	17	10	0	0	326	336
Michigan	14	5	2	7	32,972	438	448	1	0	0	1	2	19	0	4	148	171
Kansas	88	40	5	‡43	305,873	2,921	2,583	2	0	0	20	22	65	0	9	464	538
Nebraska	4	3	0	1	11,462	154	134	0	0	0	1	1	7	0	0	83	90
Oklahoma	130	74	4	§52	502,862	3,593	3,299	3	0	0	16	19	70	2	8	369	449
Texas	376	197	28	151	1,971,386	11,006	9,776	12	1	1	97	111	484	36	74	2,358	2,952
North Central (Dist. 7-B & 9)	117	50	1	66	404,520	3,467	2,989	5	0	0	37	42	267	1	23	994	1,285
West (Dist. 7-C & 8)	105	77	1	27	615,406	3,427	2,940	3	0	0	18	21	105	0	4	423	532
Panhandle (Dist. 10)	12	4	5	3	46,542	412	396	0	0	0	2	2	4	0	5	30	39
Eastern (Dist. 5 & 6)	22	10	2	10	129,796	589	723	0	0	0	8	8	15	3	2	138	158
Gulf Coast (Dist. 2 & 3)	70	32	6	32	506,592	1,620	1,375	2	1	0	22	25	51	22	17	340	430
Southwest (Dist. 1 & 4)	50	24	13	13	268,530	1,491	1,353	2	0	1	10	13	42	10	23	433	508
Louisiana	43	17	1	25	299,608	1,377	1,223	0	0	0	12	12	26	11	9	173	219
Northern	18	6	1	11	62,042	739	652	0	0	0	4	4	10	0	7	77	94
Southern	25	11	0	14	237,566	638	571	0	0	0	8	8	16	11	2	96	125
Arkansas	8	4	0	4	33,368	234	236	0	0	0	3	3	4	0	0	47	51
Mississippi	11	4	0	7	86,834	218	192	0	0	0	7	7	10	2	1	98	111
Southeastern States	2	0	0	2	13,428	40	33	0	0	0	2	2	3	0	1	23	27
Montana	13	3	1	9	46,807	174	111	0	0	0	7	7	3	0	1	41	45
Wyoming	15	8	1	6	91,068	433	417	1	0	0	2	3	18	0	3	68	89
Colorado-Utah	15	3	3	9	94,060	318	152	0	0	0	6	6	15	0	7	124	146
New Mexico	27	10	10	7	134,097	649	396	0	0	0	2	2	22	2	1	66	91
California	45	33	1	11	172,018	1,504	1,341	2	0	0	11	13	50	0	4	295	349
North Dakota	5	3	0	2	35,753	40	3	0	0	0	2	2	3	0	0	10	13
Miscellaneous (Mo., Md.)	3	0	2	1	6,412	47	63	0	0	2	1	3	0	0	16	19	35
Total United States	997	476	73	448	4,246,489	28,394	25,478	22	1	3	223	249	848	53	150	5,090	6,141
Total previous week	973	494	68	411	3,792,069			31	0	3	172	206	826	52	147	4,867	5,892
Total August 11, 1951	896	442	53	401	3,354,435			31	1	4	190	226	893	46	162	4,663	5,764

Service wells included: *9, †18, ‡1, §6.

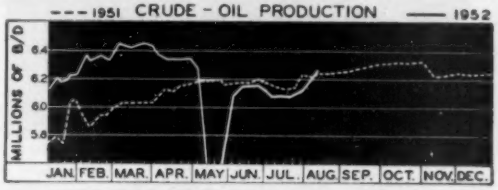


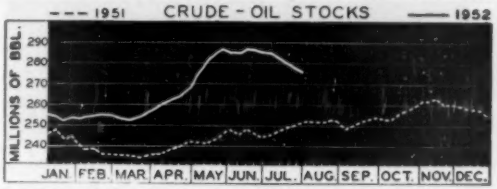


DAILY AVERAGE PRODUCTION FOR WEEK

	August 9, 1952			Aug. 2
	Crude oil	Lease condensate	Total	total
Alabama	2,850	.....	2,850	2,800
Arkansas	75,500	4,100	79,600	79,400
California	982,500	.....	982,500	980,200
Colorado	84,850	.....	84,850	82,600
Eastern	59,500	.....	59,500	59,100
Florida	1,725	.....	1,725	1,725
Illinois	165,600	.....	165,600	167,400
Indiana	32,900	.....	32,900	32,700
Kansas	311,750	.....	311,750	317,700
Kentucky	32,600	.....	32,600	33,500
Louisiana	637,125	32,900	670,025	669,425
North	111,000	9,900	120,900	121,450
South	526,125	23,000	549,125	547,975
Michigan	37,600	.....	37,600	38,000
Mississippi	92,400	3,750	96,150	96,000
Montana	26,900	.....	26,900	27,000
Nebraska	6,950	.....	6,950	6,900
New Mexico	160,700	300	161,000	164,950
Oklahoma	531,200	.....	531,200	526,500
Texas	2,749,275	41,575	2,790,850	2,648,250
Dist. 1	33,175	125	33,300	32,225
Dist. 2	151,100	3,850	154,950	143,650
Dist. 3	446,850	24,000	470,850	444,125
Dist. 4	244,950	4,400	249,350	233,675
Dist. 5	45,200	200	45,400	48,875
Dist. 6	117,825	3,600	121,425	116,325
East Texas field	263,000	.....	263,000	264,425
Dist. 7-B	98,000	50	98,050	92,700
Dist. 7-C	148,725	4,900	153,625	144,225
Dist. 8	939,875	200	940,075	880,250
Dist. 9	178,475	250	178,725	166,375
Dist. 10	82,100	.....	82,100	81,400
Utah	4,300	.....	4,300	4,200
Wyoming	183,000	.....	183,000	184,000
North Dakota	4,500	.....	4,500	4,000
Total U. S.	6,183,725	82,625	6,266,350	6,126,350
Change from previous week, up			140,000	
Canada	142,175	.....	142,175	193,700
Total U. S. production January 1-August 9			1,354,118,050 bbl.	
Same period last year (crude plus cond.)			*1,348,848,300 bbl.	

*Includes 18,091,950 bbl. condensate.



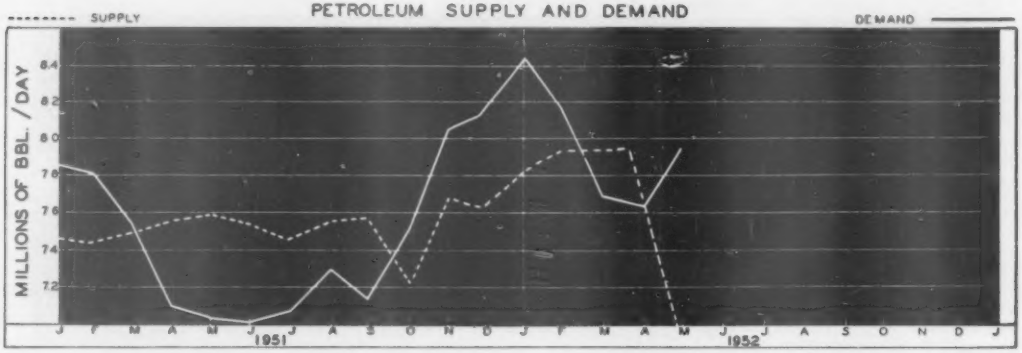


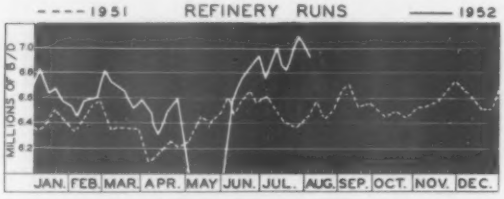
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

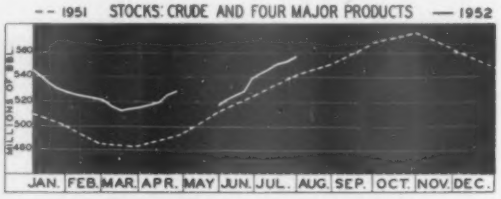
(Thousands of barrels daily)

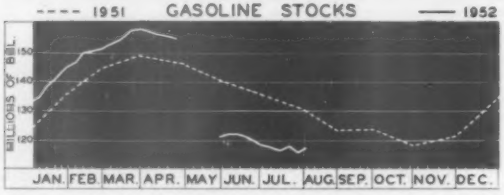
	Aug. 2, '52	July 26, '52	Aug. 4, '51
Pennsylvania Grade	2,286	2,598	2,221
Other Appalachian	2,162	2,165	1,455
Illinois, Indiana, Michigan	13,226	12,861	11,084
Arkansas	2,983	2,833	2,777
Louisiana	14,907	15,480	14,657
North	2,308	2,544	2,754
Gulf	12,599	12,936	11,903
Mississippi	3,575	3,356	3,021
New Mexico	7,768	7,880	6,312
Oklahoma and Kansas	40,017	41,470	38,637
Texas	135,386	135,897	119,063
East Texas proper	13,199	13,069	(†)
West Texas	57,959	59,453	(†)
Texas Gulf	29,543	29,457	(†)
Other Texas	34,685	33,918	(†)
Rocky Mountain	14,426	14,660	13,711
California	32,027	31,254	30,599
Foreign	7,669	7,747	8,126
Total	276,432	278,201	251,663

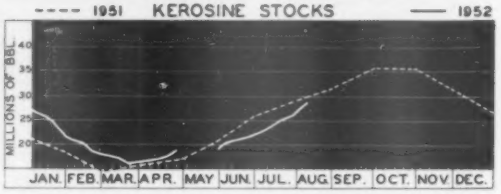
*Bureau of Mines. †Not comparable with current week.

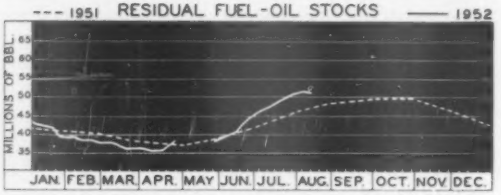










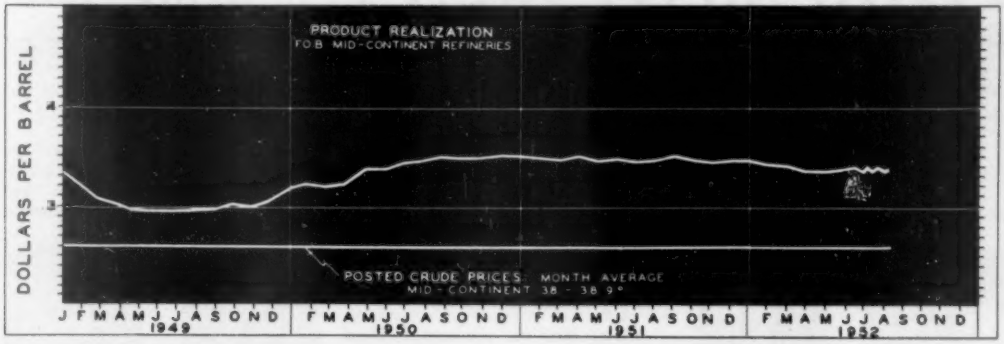


A.P.I. REFINERY REPORT, AUGUST 9

(Thousands of barrels)

District—	Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.	Stocks‡ Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, August 1951 Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.
East Coast	1,043	423.3	49.3	227.6	247.7	28,870	12,485	30,349	13,014	1,026	415.3	41.0	230.1	228.1
Appalachian:														
District 1	100	40.0	4.7	11.9	11.7	3,522	563	1,332	853	104	41.6	5.3	17.4	11.9
District 2	84	41.0	1.3	19.9	14.9	1,817	313	503	395	73	33.1	3.5	8.9	15.7
Ind., Ill., Ky.	1,303	690.1	67.3	229.4	162.0	24,675	6,086	18,721	6,555	1,203	640.4	69.9	197.2	150.5
Okla., Kans., Mo.	610	340.9	12.8	144.4	62.9	11,083	1,736	11,334	1,651	482	264.6	11.8	117.1	53.1
Inland Texas	266	168.1	12.3	46.3	40.6	3,937	481	1,859	1,078	256	173.0	12.5	39.2	41.5
Texas Gulf Coast	1,681	746.4	152.8	410.0	275.1	15,880	3,690	10,222	7,849	1,586	739.9	118.9	312.0	257.0
La. Gulf Coast	504	259.2	50.4	142.7	76.1	6,609	2,142	3,249	2,214	501	235.0	54.9	118.7	59.8
N. La. and Ark.	55	23.7	4.3	10.7	2.6	2,683	517	986	202	85	35.0	7.9	16.7	7.7
Rocky Mountain:														
New Mexico	18	10.3	.....	3.0	3.7	95	.....	73	30	16	9.0	0.1	3.3	3.7
Other Rocky Mtn.	235	112.7	2.9	46.0	40.6	3,504	430	2,023	1,375	227	103.4	5.2	43.5	41.1
California	1,010	427.7	13.9	162.1	327.3	14,573	365	9,384	16,086	980	423.7	7.9	132.5	355.5
August 9, 1952	6,909	3,283.4	372.0	1,454.0	1,265.1	117,248	28,808	90,035	51,302	6,539	3,114.0	338.9	1,236.6	1,225.6
August 2, 1952	7,033	3,331.1	382.6	1,501.4	1,220.6	116,243	27,638	86,128	51,414	.....	.....	.....	.....	.....
August 11, 1951	6,592	3,162.1	336.1	1,272.3	1,228.3	127,750	31,027	87,176	47,899	.....	.....	.....	.....	.....

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipe lines.


PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
DOLLARS PER BARREL
4
3
POSTED CRUDE PRICES: MONTH AVERAGE
MID-CONTINENT 38 - 38.9°
J F M A M J J A S O N D
1949
J F M A M J J A S O N D
1950
J F M A M J J A S O N D
1951
J F M A M J J A S O N D
1952

In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate and fuel oil. Realization averaged $3.35 for week ended August 2, $3.31 for previous week, and $3.48 for August 1951. The above trend information is based on volumes and current prices and therefore does not reflect changes in operating costs.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of August 13, 1952. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline, 80-82 octane	10⅜-10½	12.125-12.75	10¾-11
Premium gasoline, 86-88 octane	11⅜-11½	13.5-13.75	11¾-12
42-44 w.w. kerosine	8¾-9	10.65	9
No. 2 straw fuel oil	7¾-8	9.65	8
No. 6 residual	$0.90-1.00	$2.10-2.25	$1.50-1.75

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5¾	5¼	5½
Grade 18-55	6.9	6.4	6.65

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	13-13.5
750 vis., No. 3-4 neutral	16
2,000 No. 5-6 neutral	18-19

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	27-28
200 vis., No. 3 neutral, 0-10 pp.	14.5-15.5

Western Pennsylvania

145-155 vis., 10 p.t. bright stock	32.5
180 vis., 0 p.t. neutral	31.5

WAX

Mid-Continent

132-134 A.M.P.	5.5

FOLLOWING the substantial reductions of 13 to 36 cents in Gulf Coast and East Coast residual fuel oil prices of last week, refinery markets generally have been unchanged over the past few days.

Prices to conform with the general reductions at refineries are being announced from day to day applying to additional Atlantic Seaboard distributing centers and also scattered points in the entire Caribbean area.

Sellers were hopeful that lower schedules would result in more buying from users who have been inclined to stay out of the market in expectation of the lower posted prices. The price reductions reflected large inventories and keen competition for coastal markets from both domestic and import sellers.

In the Mid-Continent, Middle West, and Rocky Mountain areas prices on fuel oils were generally unchanged. Residual fuels are still considered weak with occasional price concessions of 5 to 15 cents per barrel from small refineries whose storage is full.

While prices are unchanged from a week ago, the No. 1 and No. 2 distillate markets continued slow, particularly at interior refining centers. Here again scattered concessions in prices were reported on small spot shipments by sellers who are not in position to add to their storage.

Reports over the past week from all refining centers were in agreement that motor fuel prices on both regular and premium are firm with the heaviest movement of the year now under way.

Natural gasolines, following the ¼-cent general advance of a week ago, are firm with many sellers expecting additional increases before the end of the month. This strength reflects the record gasoline demands and is also partially seasonal. Grade 26-70 is firm at 5¾ cents basis Group 3 and 5¼ cents in North Texas.

CRUDE PRICES

GRAVITY SCHEDULE

	Signal Hill, Calif.‡	Oklahoma, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$1.93	....	....	....
19-19.9	1.98	....	....	....
20-20.9	2.03	$2.25	....	$2.12
21-21.9	2.07	2.27	....	2.14
22-22.9	2.12	2.29	....	2.16
23-23.9	2.18	2.31	....	2.18
24-24.9	2.24	2.33	$2.56	2.20
25-25.9	2.30	2.35	2.58	2.22
26-26.9	2.36	2.37	2.60	2.24
27-27.9	2.41	2.39	2.62	2.26
28-28.9	2.46	2.41	2.64	2.28
29-29.9	2.52	2.43	2.66	2.30
30-30.9	2.57	2.45	2.68	2.32
31-31.9	2.62	2.47	2.70	2.34
32-32.9	2.68	2.49	2.72	2.36
33-33.9	....	2.51	2.74	2.38
34-34.9	....	2.53	2.76	2.40
35-35.9	....	2.55	2.78	2.42
36-36.9	....	2.57	2.80	2.44
37-37.9	....	2.59	2.82	2.46
38-38.9	....	2.61	2.84	2.48
39-39.9	....	2.63	2.86	2.50
40 and above	....	2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6, 1947.

‡Standard Oil Co. of California.

FLAT CRUDE PRICES

Representative posted schedules per barrel.

Kettleman Hills, California*	$2.80
Louisiana:	
Beauregard Parish	2.60
Cotton Valley (distillate)	2.85
Cotton Valley (crude)	2.70
Texas:	
East Texas	2.65
Pecos County (Yates)	2.35
Conroe	2.83
Van	2.48
Pennsylvania Grade:	
Bradford	4.25
Southwest Pennsylvania	3.82
West Virginia	3.76
Illinois Basin	2.77

*37°-37.9°.

EQUIPMENT MEN . . . in the News

Mid-Continent Supply Promotes Muenster, Murry

Ken W. Davis, president of Mid-Continent Supply Co., Fort Worth, has announced the promotion of R. F. Muenster from store manager at Wichita Falls, Tex., to North Texas district machinery manager, and A. L. Murry, former Wichita Falls field salesman, to store manager at the same location.

R. F. MUENSTER

A. L. MURRY

Muenster served Mid-Continent 6 years as store manager at Wichita Falls until his recent promotion. Before coming to work for Mid-Continent, he was employed by two tool companies, and another supply company.

Murry has been with the company 6 years, 4 of them as field salesman.

McCoy Elects to Retire From Jones & Laughlin

ROBERT McCOY

The retirement of Vice President Robert McCoy, Jr., from the Jones & Laughlin Supply Co. where he had completed 39 years of continuous service on July 7, 1952, and elected to retire from business on August 1, 1952, has been announced by J. L. Shakely, president of the company.

McCoy joined Frick-Reid Supply Co. (now Jones & Laughlin Supply Co.) in July 1913 as a storeman at Cushing. He was promoted to store manager of the Cushing store in 1913, and in 1916 was transferred to the Drumright, Okla., store as store manager. In 1919 McCoy was elevated to district manager and remained in Drumright until 1922, when he moved to Tulsa. After serving as district manager for a 5-year period ending in early 1929, he was appointed sales manager of the company's western division at Tulsa. McCoy continued in this capacity until he was elected vice president and a director of the company in 1938, at which time the general offices of the company were moved from Pittsburgh to Tulsa. McCoy attended Amherst College, Amherst, Mass.

Van Winkle Appointed To Rocky Mountain Area

Harold Sheridan, president of Baird Manufacturing Co., Tulsa, has announced the appointment of L. E. Van Winkle as company sales representative for the Rocky Mountain area. Van Winkle has spent 6 years in this area as a supply representative. He will be based in Billings, Mont., but will cover all Rocky Mountain states plus North and South Dakota for Baird Manufacturing Co.

National Supply Announces Changes in Export Division

Promotions of Calvin B. Carter to assistant sales manager, and R. Carson Allan to division engineer have been announced by export division of The National Supply Co.

Carter began with the company in 1937, and served in National's oil-field stores in Louisiana and the Texas Gulf Coast area until 1941, when he was transferred to the Toledo plant. In 1944 he was appointed drilling equipment engineer for the company's plant products division at Houston and was made division engineer for the export division in New York in 1947.

C. B. CARTER

R. C. ALLAN

Allan joined the company in 1938. During the years 1938 to 1947, he was a part of the engineering department of the Toledo plant, but most of his time was spent in the various oil fields of the Mid-Continent and Southwest. He was transferred to the export division in 1947 and appointed assistant division engineer for export in 1948.

McCullough Promotes Four Key Personnel

Promotion of four key personnel was recently announced by I. J. McCullough, president of McCullough Tool Co. M. L. Van Wagner was appointed assistant eastern division manager with headquarters at Houston; Robin Knight was promoted to senior salesman at McCullough Oklahoma City district office; R. L. Walker has been made branch manager at Snyder, Tex., and Sam B. Jones named branch manager at Hadacol Corner, Tex.

VAN WAGNER

ROBIN KNIGHT

R. L. WALKER

S. B. JONES

Van Wagner started with McCullough in 1947, and advanced rapidly in service work to become safety engineer of the eastern division of the company in 1950.

Knight, with McCullough since 1948, has held many governmental executive positions, both in the State of Oklahoma and in Oklahoma City. Knight's new duties as senior salesman will consist chiefly of city sales work in Oklahoma City.

Walker began with McCullough in 1944 as a rigger in Oklahoma, and he has worked in the oil fields of Texas, Oklahoma, and New Mexico, up to his present position as the new Snyder, Tex., branch manager.

Jones joined the company in 1947 as rigger at Hobbs, N. M., branch. Because of his wide range of experience, Jones was appointed manager when McCullough opened a new service branch at Hadacol Corner.

T.E.M.A. Elect Officers At 3-Day Conference

Officers for the coming year in the Tubular Exchanger Manufacturers Association were recently elected at the annual meeting of the association. The 3-day conference was held at Skytop, Pa., late in June. Elected to head the organization were J. E. Hughes, president, and G. A. Worn, vice president. Hughes is director of the heat-transfer division of Western Supply Co. of Tulsa. Worn is manager of the heat-exchanger department of Lummus Co. of New York. Reelected as secretary-treasurer was George P. Byrne, Jr., also of New York.

T.E.M.A. is a group of independent shell-and-tube heat-exchanger manufacturers organized to further the standardization of mechanical construction and detail of heat-transfer equipment.

Serving on the executive committee of T.E.M.A. throughout the coming year will be Hughes, Worn, W. C. Beekley of Whitlock Manufacturing Co., and E. E. Dillman of Engineers & Fabricators, Inc.

Present members of T.E.M.A. are: American Locomotive Co., Dunkirk, N.Y.; Engineers & Fabricators, Inc., Houston; Foster Wheeler Corp., New York; The Griscom-Russell Co., Massillon, Ohio; The M. W. Kellogg Co., New York; The Lummus Co., New York; Ross Heater & Manufacturing Co., Inc., Buffalo; Southwestern Engineering Co., Los Angeles; Struthers Wells Corp., Warren, Pa.; Henry Vogt Machine Co., Louisville; Western Supply Co., Tulsa, and The Whitlock Manufacturing Co., Hartford.

Halliburton Transfers Three Regional Vice Presidents

Reassignment of Halliburton Oil Well Cementing Co.'s three regional vice presidents has been announced by L. B. (Preach) Meaders, vice president for field operations.

Harry P. Conroy has been transferred from the southern to the northern region; Fred R. Whitten from the northern to the central region, and R. G. Kelly from the central to the southern region. All three men will continue to headquarter at Duncan, Okla., home office of the Halliburton organization.

Franks Promotes Leyh

J. G. LEYH

The appointment of John G. Leyh as assistant sales manager of Franks Manufacturing Corp. is announced by Stuart Corry, sales manager. Leyh, who has been with Franks for 12 years, was assistant service manager prior to his current appointment.

Bovaird Supply Co.'s new store at Lovington, N. M.

Bovaird Supply Opens New Store

Bovaird Supply Co. has opened a new store at Lovington, N. M., according to Raymond E. Batchelor, general manager of stores. The company is now operating 23 stores and offices in Illinois, Kansas, Oklahoma, Texas, and New Mexico.

The new store will be under the management of T. B. (Tom) Pierson, who has been stationed at Salem, Ill. Staffed by trained personnel, the Lovington store will carry complete stocks of oilfield equipment and supplies, with large warehouse and storage-yard facilities. It will be under the supervision of J. R. Kennedy, manager of the West Texas district office at Midland, Tex.

Bovaird is now in its eighty-first year of service to the petroleum industry.

Cummins Sales Names Executive Promotions

E. G. ELLIS

Two Cummins Sales & Service, Inc., executive promotions were announced recently by Ken W. Davis, president.

E. G. Ellis has been promoted from general service manager to vice president, maintenance and engineering, and J. L. Peeler, former assistant purchasing agent at Fort Worth, appointed to director of purchases at the same location.

J. L. PEELER

G. J. VAN DYKE

Ellis' sales and service experience include work as export service manager with Mid-Continent Cummins Export Corp. in New York City; mechanic for Cummins Sales & Service, Inc., Odessa, Tex., and service manager for the organization at Houston.

In 1935 Peeler began working for Mid-Continent Supply Co., and his service with the firm includes store manager at both Odessa and Seagraves, Tex., and diesel department manager at Fort Worth. Peeler has been with Cummins Sales & Service, Inc., since its organization in 1946.

In another release the company also announced the appointment of G. J. Van Dyke as district service manager at Pharr, Tex. Van Dyke began his career with Cummins in 1945 as shop mechanic. He was subsequently promoted to field service man at Odessa, Tex., then to shop foreman at the same location.

Scientific Firm Sold to Beckman Instruments, Inc.

The purchase of the business and assets of Berkeley Scientific Corp., Richmond, Calif., by Beckman Instruments, Inc., South Pasadena, Calif., has been announced by Dr. Arnold O. Beckman, president of Beckman Instruments, Inc. Berkeley Scientific Corp. has been dissolved and the operations will continue as the Berkeley Scientific Division of Beckman Instru-

ments, Inc. No changes in management or personnel are contemplated.

W. K. Rosenberry, founder and president of Berkeley Scientific, becomes a vice president of Beckman Instruments and will remain in charge of operations at the Richmond plant.

Cooke Tractor to Sell A-C Products in Illinois

Southern Illinois oil fields are now being served with Allis-Chalmers crawler tractors and motor graders by Cooke Tractor Co., Inc., Allis-Chalmers industrial dealer at St. Louis. Twenty-six counties in Illinois have been added to Cooke Co.'s territory in Illinois and Missouri.

Illinois Road Equipment Co., Springfield, Ill., has had the counties of Crawford, Fayette, and Jasper added to its Allis-Chalmers territory, which has also included some of the oil-bearing counties such as Effingham, Ill.

Complete service facilities and parts stocks are available from these firms for Allis-Chalmers equipment and other lines they represent.

McKinney to Manage New C-R-C Supply Division

I. W. McKINNEY

I. W. McKinney has been appointed manager of the newly formed C-R-C Supply Division, according to A. S. Crutcher, president of Crutcher - Rolfs-Cummings, Inc.

Before joining C-R-C McKinney was in the valve division of Cameron Iron Works, Inc. He was formerly a field engineer and metal inspector for Humble Oil & Refining Co. at Baytown, Tex., and a pipe-line engineer for Humble Pipeline Co.

The new division will carry a complete line of pumps, valves, fittings, and hand tools. The supply division is located at the main office of the company in Houston.

Clark Bros. Changes Name

Clark Bros. Co., Inc., Olean, N. Y., began July 1 operating as Clark Bros. Co., division of Dresser Operations, Inc., another fully owned subsidiary of Dresser Industries, Inc. Officers, personnel, and operating procedures of Clark will continue unchanged under the new divisional setup. The change is being initiated for corporate simplification purposes.

Degen Pipe & Supply Co.'s remodeled office and supply yard.

Degen Pipe & Supply Co. Remodels Supply Yard

Now doing business at its completely remodeled supply yard is Degen Pipe & Supply Co. of Tulsa. The company specializes in sales and rentals of used drilling and fishing tools for both cable-tool and rotary type drilling, and also stocks a complete line of pipe, servicing equipment, lease equipment, and general oil-field supplies. Its unusually large stock of cable tools is part of a large assortment of drilling and producing equipment.

LA Nomads Celebrate 13th Annual Whing Ding

More than 300 Nomads and guests gathered at the Riviera Country Club recently to celebrate the thirteenth annual Whing Ding of the Los Angeles Chapter of Nomads. The event started in early morning with a golf tournament. A banquet was served in the evening and, following the banquet, Bill Wilson, president of the chapter, greeted members and guests. Prizes were awarded by blind bogey in addition to prize for low gross, and a consolation prize for high gross. The winners were: George Winterburn, low gross; Rand Morgan, Fred Tschirgi, Bill Budd, Lee Drake, Sam Patterson, Bud Castle, and Herman Schaller, in the order named in the blind bogey, and Bern Orme, high gross. Door prizes were awarded to Dante Siracusa, S. R. Bowen Co.; Jack Freeman, Bethlehem Supply Co.; Glenn Johnson and Leo Cypher, Baash-Ross Tool Co.; Carl Krager, Richfield Oil Co.; Jess Andrus, Emsco Derrick & Equipment Co.; Ralph Clemmons, Bethlehem, and Kingsley Nicholson.

The occasion was handled by committees consisting of the following members of the Los Angeles chapter: Bill Sargent, Sargent Engineering Co.; Bill Bettis, Johnston Testers, Inc.; Joe Schlarb, Chiksan Co.; George Gutekunst, Gardner - Denver Co.; Babe Doyle, Hydril Co.; Vern Mitchell, Security Engineering Co., Inc.; John Flanagan, Johnston Testers; Jerry Engstrand, Grant Oil Tool Co.; Ray Humphreys, Axelson Manufacturing Co.; Joe Siegel, Kobe, Inc.; Bill Althouse, Baker Oil Tool, Inc.; Ed Van Loozen, Web Wilson Oil Tools; Rex Collins, Hydril; Leo Cypher, Baash-Ross, and Dick Winder, Chiksan.

Winners of door prizes at the annual Whing Ding of Los Angeles Chapter of Nomads held recently at the Riviera Country Club. Back row: Glenn Johnson, Ralph Clemmons, Jack Freeman, Carl Krager, and Dante Siracusa. Front row: Kingsley Nicholson, Jess Andrus, and Leo Cypher.

BJ Service Names Box to Executive Position

William T. Box has been promoted to the position of executive assistant on the general office staff at BJ Service, Inc., as announced by John Merritt, executive vice president and general manager for BJ. Box has been an employe of Byron Jackson Co. for the past 12 years, where he was associated with research and development work for 5 years on jet process of oil-well perforating pioneered by Byron Jackson.

In his new position, Box will supervise and direct technical aspects of all services offered and developed by the company.

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BONANZA A-35. Serial D1776 NC 451B. 400 hrs. aircraft and engine. Painted white and blue with nose, wing tips and tail red. Constant speed plastic prop. Gyro compass, artificial horizon. Radio, Mitchell omni avigator with transmitter, Lear ADF with transmitter, ARC receiver, all radios VHF. In addition, have spare remanufactured engine 205 HP E80 starter. Price $13,000.00. Floyd C. Ramsey, 605 Melba Building, Dallas, Texas.

FOR SALE in the Seminole area, 4 atmospheric cooling towers at plants recently shut down. Complete data upon request. Cities Service Oil Company, Patridge, Bartlesville, Oklahoma.

PIPE FOR SALE

1600'—16" OD—5/16 Wall, P. E. Pipe.
15000'—6⅝" OD 18.97 weight Line Pipe P. E. or T & C; also quantities of Seamless & Lapweld Casing & Tubing, Line Pipe, all sizes.

SABINE MACHINE & SUPPLY CO.
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CASING FOR SALE

5000 ft. of slightly used Japanese casing, 5½", 15½ lb. J-55, $3.15 per foot. Not subject to OPS.

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Reconditioned Seamless TUBING

1½" O.D.
2" O.D.
2¼" O.D.
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Approximately 5 miles or more of each size available in single or double random lengths, plain ends, beveled for welding.

Ideal for gas, water, oil and air lines.

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EQUIPMENT FOR SALE

WELL drilling equipment, new or used. Spudders, rotaries, core & shot hole drills, tools, pipe, bits, blocks, pump jacks, valves. Everything for well drilling and service. Fishing tools rented. Pressey & Son, Pueblo, Colo.

FOR SALE: 1-43C Heavy Duty Star Spudder A-1 Condition, complete with 10" to 5" Tools, Diesel Power and all necessary equipment to drill wells. Contact A. H. Alcock, Box 148, Office phone #301, Res. phone 2270, Chanute, Kansas.

FILTERS for Oil Clarification

22—Sperry 18" x 18" Filter Presses, plate and frame, closed delivery, 11 chambers, ½".

CONSOLIDATED PRODUCTS CO., INC.
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Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-56 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units. Westinghouse 20-25-50 KW Generating Units.

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GAS COMPRESSOR CYLINDERS

1—26" x 20" Compressor Cylinder
1—24" x 20" Compressor Cylinder
1—18" x 26" Compressor Cylinder
All above units are complete and in good operating condition and located in Benton, Illinois.

PIPE

20,000 ft.—8⅝ O.D. x .188 Wall—S.R.L. P.E. Bev.
75,000 ft.—3½ O.D. x .154 Wall—S.R.L. P.E. or T & C
1764 ft.—24" Class 200—B.&S.—Cast iron pipe
964 ft.—18" Class 200—B.&S.—Cast iron pipe
1634 ft.—14" Class 200—B.&S.—Cast iron pipe
900 ft.—12" Class 200—B.&S.—Cast iron pipe
468 ft.—8" Class 250—P.E. Cast iron pipe
Above pipe located in Kansas City.

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Norman Strauss Phone HArrison 1000

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FOR SALE: One 4'0" ID x 40'6" x 11/16" shell Tower. Hastalloy lined, no trays. 200# WP for vertical erection. Price $1,500.00. Kinslow Power & Equipment Co., 817 So. Boulder, Tulsa 14, Okla.

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FOR SALE

28,000' 2⅜" o.d. black line pipe SRL, used
4,500' 4½" o.d. black line pipe SRL 10.79# used

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USED NATIONAL MODEL-50 ROTARY RIG READY TO DRILL COMPLETE WITH

Lee C. Moore 97' Mast, two JL1335 Buda Engines in excellent running condition, C-150 Slush Pump, 3750' Drill Pipe, and all tools and equipment necessary for immediate operations.

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EQUIPMENT FOR SALE

83 STAR Speed Spudder Semi-trailer mounted, Complete with tools for 5 and 7" hole, Good wire, propane equipped, Kohler light plant, dog house, and all hand tools. Rig completely rebuilt and priced to sell. Call: Charles V. Cross, Phone 125, Madison, Kansas, or Herbert H. Hart, Phone 1371-W, El Dorado, Kansas.

FOR SALE

1—Bessemer type ten with 17" overhead power cylinders. Compressor cylinders to suit purchaser.

1—Clark twin gas engine driven compressor with overhead power cylinders and compressor cylinder to suit purchaser.

1—Bessemer type ten single 80 hp. 16" overhead exhaust. Above machines completely rebuilt.

W. S. SMITH

Tulsa 2-5473 — 205 Thompson Bldg.

Tulsa, Okla.

EQUIPMENT FOR SALE

SALES and rentals of cable drilling and fishing tools, casing and equipment, from the Southwest's largest stock of used cable tools and oil field supplies. Degen Pipe and Supply Co., Tulsa, Oklahoma.

FOR SALE at Madison, Kansas, one used 8" x 3¾" x 8" Ingersoll-Rand, vertical 2-stage compressor unit, 1000# starting pressure, 500# operating pressure, 135 CFM for belt drive. $250.00. Cities Service Oil Company, Patridge, Bartlesville, Oklahoma.

EXECUTIVE B-25 For Sale: Converted by AiResearch Aviation in 1949. Very plush interior. Seats 8 passengers comfortably. Formica type interior. Total airplane time, 1300:00; left engine total, 102:00; right engine total, 480:00. New props, new tires, 1000-lb. baggage compartment in nose. 200,000 Janitrol heater. High pressure oxygen system. Ice box, liquid thermos, toilet, cabin radio, two speakers. 260 MPH cruise, 1800-mile range. Airline type fire warning, Aeroquip hose, collector rings. Radio: ARC Omni, ILS, Dual ADF, Marker beacon, Low frequency transmitter and receiver, ARC Isolation amplifier, ARC-VHF transmitter and receiver. Ship very clean inside and out. A-1 condition. Continental Oil Company, Aviation Section, Ponca City, Oklahoma. Telephone LD-7, Extension 650 or 322.

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2—EFCO Exchangers #19-20-733 sq. ft. surface ea. 1" O.D. steel tubes.
2—EFCO Exchangers #8-20-204 sq. ft. surface ea. ¾" O.D. steel tubes.
1—EFCO Reboiler #17-16-561 sq. ft. surface; ¾" O.D. steel tubes.
2—EFCO Exchangers #25-16-1060 sq. ft. surface ea. ¾" O.D. steel tubes.
1—EFCO Reboiler—#13-16-377 sq. ft. surface; ¾" O.D. steel tubes.
2—G-R Reboilers #24-8-192, 837 sq. ft. surface ea. 1" O.D. steel tubes.
1—EFCO Condenser #19-16-738 sq. ft. surface; ¾" Admiralty tubes.
1—EFCO Exchanger #31-16-1450 sq. ft. surface, 1" O.D. steel tubes.
1—EFCO Steam Generator #21-16-647 sq. ft. surface; 1" O.D. steel tubes.
1—EFCO Exchanger #17-16-445 sq. ft. surface; ¾" O.D. steel tubes.
2—EFCO Exchangers #29-20-2800 sq. ft. surface ea. ¾" O.D. steel tubes.
1—EFCO Exchanger #19-16-510 sq. ft. surface, 1" O.D. steel tubes.
2—EFCO Coolers #15-20-518 sq. ft. surface ea. ¾" O.D. Admiralty tubes.
1—EFCO Cooler #21-20-1200 sq. ft. surface; ¾" O.D. steel tubes.
1—EFCO Cooler #21-20-1272 sq. ft. surface, ¾" O.D. steel tubes.
2—EFCO Exchangers #17-16-515 sq. ft surface ea.; ¾" O.D. steel tubes.
1—EFCO Reboiler #43-16-2010 sq. ft. surface; 1" O.D. steel tubes.
1—EFCO Condenser #21-20-1100 sq. ft. surface; ¾" O.D. Admiralty tubes.
1—EFCO Intercooler #12-20-1162 sq. ft. surface; ¾" O.D. steel tubes.
1—G-R Tubeflo—8 sections—type 18KCS-244.
1—EFCO Exchanger #13-16-230 sq. ft. surface; 1" O.D. steel tubes.
1—EFCO Exchanger #14-16-421 sq. ft. surface; ¾" O.D. steel tubes.

Approximately 25 Units of Various Sizes Of Atmospheric Coolers.

TOWERS (All Welded—API-ASME Code)

4—6'x63' x 3/8"x1/2" Heads; 2 with 24 Trays; 2 with 27 Trays.
1—6'x36'x3/8"x1/2" Heads, 10 Trays.
1—6'x36'x3/8"x3/8" Heads, 12 Trays.
1—6'x27'x5/16"x3/8" Heads, 10 Trays.
1—4'x76'x3/8"x3/8" Heads, 32 Trays.
1—5'x62'x3/4"x1/2" Heads, 24 Trays.
1—3'x15'6"x5/16"x3/8" Heads.
1—72"x28'x5/16"x3/8" Heads, 15 Trays.
1—42"x28'x1/4"x5/16" Heads, 15 Trays.
1—4'x20'x5/8"x5/8" Heads.
1—3'x30'x3/4"x7/8" Heads.

PROCESS VESSELS (All Welded—API-ASME Code)

1—4'x12'x1/4"x3/8" Heads Accumulator.
3—5'x20'x5/16"x3/8" Heads Receivers.
1—3'x8'x1/2"x1/2" Head Receiver.
1—5'x17'x3/8"x1/2" Head Accumulator.
1—2'x8'x1/4"x5/16" Head Stripper.
1—5'x4'x3/16"x3/16" Head Inhibitor.
1—10'x22'6"x7/16"x1/2" Head Surge Tank.
2—8'x4'x3/16"x3/16" Head Drum.
1—48"x16'x3/16"x5/16" Head Receiver.

PUMPS

2 Crude Charge Pumps, Worthington Type KLS, 4½x10, 4500 BPCD with 25 h.p. 220/440 volt, 3 phase, 60 cycle motors.
4—Hot Oil Charge Pumps, Worthington Type 2 UT 2, 4000 BPCD at 610° Head, 400° F, 50 h.p. 220/440 volt, 3 phase, 60 cycle motors.

SPECIAL OFFERING
PROPANE COMPRESSOR UNIT

11"x5"x11" Class ES-2, Ingersoll-Rand Straight Line Horizontal Compressor, Serial #79819 with Piping, Intake 2.3#, Discharge 185.3# with 75 h.p. explosion proof fan-cooled motor, 440 volt, 3 phase, 60 cycle.
3 G-R Type DAAA-248 Std. Twin G-fin, Propane Condenser Sections.

COMPLETE GLYCOL DEHYDRATION UNIT

Maximum capacity 12,000,000 SCFD with direct fired Heater, Reboiler, Heat Exchangers, Contactor, Filters, Surge Tank, Pumps, Pipe Valves and Fittings, used less than one year, excellent condition.

ADDITIONAL SPECIFICATIONS, DRAWINGS AND PRICES FURNISHED UPON REQUEST. INSPECTIONS INVITED.

Wire - Phone - Write

TO

Refinery & Gasoline Plant Equipment, Inc.

P. O. Box 13203 — Phone LYnchburg 3806

HOUSTON 19, TEXAS

EQUIPMENT FOR SALE

10,000' 4½" API Full Hole Drill Pipe tested by Sonoscope engineers, also 1075' 6⅝" OD 36# Drill Pipe, like new. Milford Giffin, Tel. 477, Hoisington, Kansas.

ROTARY RIG Complete—For Sale: Bethlehem Breeze S-45 with Twin GMC's Torque converted drawworks with 96 foot Lee C. Moore mast. 7½" x 14" Bethlehem Pump with twin six GMC's. Includes Dog house, fuel tank, water tank, mud boats, and 3,400 feet of Drill Pipe. We desire to sell this rig because it is too small for West Texas operations. We will guarantee this rig to be in A-1 condition and ready to work. It is practically brand new. This rig is in our yard at Salem, Illinois. Herman Graham Drilling Company, Box 176, Salem, Illinois.

25,000# STEAM per hour, HWW, 262# WP, ASME Integral furnace, perfect. Priced right. United Steel Products Co., 1534 Texas St., Memphis, Tennessee.

FOR SALE: 1—35 AH Dodge Drilling Clutch Powered 145 GK Waukesha Engine. Good Condition. (Used). 1—50 AH Dodge Drilling Clutch Powered JL-1335 Buda Engine. Fine Condition (Used). 1—Young Drilling Unit Powered R6I Climax Engine in Good Condition, (Used). 1—2-720 Gal. Butane tank on skids, also a quantity Used Cable Drilling Tools of all kinds in Good Condition. Midway Tool Company, Box 248, Mt. Pleasant, Michigan.

10,000' of 2¼" O.D. and 10,000' of 2" O.D. seamless steel tubes in extra good condition. Also 2—200 bbl. heavy horizontal oil storage tanks. Box 237, Chetopa, Kansas.

FOR SALE: Casing, several thousand feet 10¾" 32# H-40 range 2 and several thousand feet of 8⅝" 24# J-55 range 2. Located Central Pennsylvania, excellent condition, good price for quick sale. Also 1500 feet 20# 7", will sacrifice. Box E-891, The Oil and Gas Journal, Tulsa, Oklahoma.

PIPE
IMMEDIATE DELIVERY

Subject to Prior Sales

Clean, Straightened & Beveled, Double Jointed or With Couplings.

OPS Ceiling Prices FOB Mexico and St. Charles, Mo.

APPROXIMATELY 350 miles—8⅝" OD Line Pipe—28.55#, .322 Wall.

APPROXIMATELY 30 miles—12¾" OD Line Pipe—50#, .375 Wall.

Phone, Write, Wire

CONSTRUCTORS' MATERIAL & EQUIPMENT COMPANY

General Delivery, Phone 95, Mexico, Mo. Box 5216, Phone 8-3378, Tulsa, Okla.

FOR SALE
USED REFINERY EQUIPMENT

ONE (1)—Vacuum Flash Tower; Top section contains 5 trays on 27" spacing. I.D. is 9 feet. Bottom section contains 5 trays on 27" spacing. I.D. is 6 ft. (11)—18" Manways on ½" thick shell.

ONE (1)—3'6" O.D. Fractionating Tower containing 5 trays on 24" spacing. Design Pressure 25 P.S.I.G.

ONE (1)—5' x 17' Sulphur Tank; ⅜" Shell and Dished Heads.

ONE (1)—4' x 12' Distillate Receiver Tank; ⅜" shell and ½" Dished Heads.

ONE (1)—Water Tower welded; 100,000 gallon capacity mounted on 70' steel supports.

ONE (1)—150,000 gallon storage tank. Welded 16' high x 40' diameter.

TWO (2)—Pressure Tanks—80# 10' x 44' —25000 gallon capacity each. ⅝" shell, ¾" heads.

25,000 square feet of condenser and exchanger surface in various sizes. Expansion Joints; Ring type, 8" to 24". Valves; Electric Motor Driven.

Many other miscellaneous items such as pumps, valves, flanges, tube return bends, stacks, etc.

Located in Michigan. For further information write or contact Box E-920, The Oil and Gas Journal, Tulsa, Okla.

EQUIPMENT FOR SALE

BUCYRUS-ERIE 36-L, New 1950, Cummins diesel engine, complete string tools 5 to 8". New 3500 ft. wire line. Used very little and like new in every respect. $22,500. Oil Producers, Inc., Murray Bldg., Grand Rapids, Michigan.

FOR SALE NEAR BURRTON, KANSAS: 4 Used 100 HP Clark Single Engine Compressor Units with 16" by 20" Speltz Power Cylinders Overhead Water Cooled Exhaust, Remco Gas Injectors and 16" x 20" D. A. Comp. Cyls. Cities Service Oil Company, Patridge, Bartlesville.

FOR SALE at our Seminole warehouse, 2 150 HP, 6 cylinder, 5½" x 6", Sterling, used Gasoline engines, one right hand, one left hand rotation both with Twin Disc clutches and V pulleys and radiators, extra parts available, lot $1,500.00. Cities Service Oil Company, Patridge, Bartlesville, Oklahoma.

FOR SALE: 1—22 AH Dodge Drilling Clutch Powered 145 GK Waukesha Engine, Good Condition (Used). 1—50 AH Dodge Drilling Clutch Powered JL-1335 Buda Engine, Fine Condition (Used). 1—Young Drilling Unit Powered R61 Climax Engine in Good Condition (Used). 1—3-720 Gal. Butane tank on skids, also a quantity Used Cable Drilling Tools of all kinds in Good Condition. Midway Tool Company, Box 248, Mt. Pleasant, Michigan.

EQUIPMENT For Sale: 2—32 hp. pumping units. 1 Nt'l, skid mounted. 1 Emsco on cement. 1—Tank battery B S & B, 1—10x24 wooden gun bbl. 2—250 bbl. bolted steel tanks. 1—New 10x16 210 bbl. wooden gun bbl. ready to move. 1—5500G Caterpillar gas or gasoline engine w/ 2 V belt pulleys—outboard bearing. Harper Well Servicing, Box C, Burrton, Kansas.

1951 INTERNATIONAL TD18A For Sale. 74" tread crawler tractor. Equipped with Ateco inside Bulldozer with heavy winch and winch guard. This tractor has only 340 hours service. We have moved our operations from Illinois to West Texas. This tractor is located in our yard at Salem, Illinois. Herman Graham Drilling Co., Box 176, Salem, Illinois.

FOR SALE: 1—Complete 2300 Volt Allis-Chalmers Generator, 32.7 amps, 3 phase, 60 cycle, 720 RPM, rewound to 440 volts, c/w DC Generator Exciter, 2—5A Westinghouse Cutouts 50 amp. 5000 volt, Watthour Meter, Westinghouse Double Circuit Feeder Panel, powered with 120 HP Twin Cylinder Superior Gas Engine, 1 Model 96 Happy-Young Engine Cooler, $9000.00. 1—50 KVA Generator Complete, DC, 1½ KW, 3500 RPM, 125 Volt, 12 Amp w/Alternator, 1—440 Volt GE Oil Switch, c/w GE Switchboard Panel, Instrument Panel and with 1—30 HP Type CS Superior Gas Engine, $1800.00. 1—85 KW Generator powered direct with 17000 "Cat." Diesel, $8000.00. 1—25 KW Generator powered direct w/Continental Gasoline Eng., $1800.00. 1—15 KW Generator powered direct w/Hercules Diesel Engine, $1800.00. Large quantities 7 HP to 70 HP Gas Engines, new and used. Large quantities Oilfield Heaters and Gun Barrels. Approximately 500 Ton Oilfield Fittings, Connections and 2, 3, and 4 inch junk pipe. Rhea Fletcher Rental Equipment, P.O. Box 418, Salem, Illinois, Phone 87.

DRIVE PIPE COUPLINGS—For sale, 81 pcs. 14" OD x 4" taper. New Prime. Less than current prices. Julius M. Fogelman, 1649 Perkiomen Ave., Reading, Penna.

FOR SALE: Fort Worth Super "J" Spudder with large assortment heavy cable tools and wire lines, also engine, propane tank and other miscellaneous equipment. A heavy duty rig for drilling in the Rocky Mountain Area. $15,000.00. Located at Chromo, Colorado, in the San Juan Basin. Subject to prior sale. Contact H. Blume Johnson, Butler-Johnson Service Corp., Shreveport, La., or W. J. Osterhoudt, Box 175, Durango, Colo.

I HAVE 1850' of 32#, 8" lap-weld second-hand casing; will trade for 4½" OD, 5½" OD or 7" OD casing. Call Francis Loriaux, Phone 21, Lost Springs, Kansas.

FOR SALE: One model R Cardwell double drum hoist Serial No. RLGMD-687 powered by Model GK-145 Waukesha engine. New, never been used. Factory list price plus trucking and insurance. Fox Well Servicing Co., Box 488, Healdton, Okla. Phone 605.

EQUIPMENT WANTED

WANTED: 12" OD, new or used couplings. Advise thread, length, condition and price. Can use several hundred if they are good. Atlas Pipe, Inc., of Corpus Christi, P. O. Box 2368, Corpus Christi, Texas.

WANTED: 4" OD 14.5# Grade D drill pipe, new, plain end, or good used. Have CMP allotment. CAMCO, INC., Houston, Texas.

WILL PAY highest prices for used casing, used line pipe, abandoned leases, or other surplus lease equipment. Your idle producing equipment is worth dollars. Green Pipe & Supply Co., Box 1383, Tulsa, Oklahoma

WE BUY well drilling equipment machines, cable tools, pipe, etc. Turn your surplus equipment into cash. Pressey & Son, Pueblo, Colorado.

WANTED: Three engine compound for Wilson Titan drawworks. Makin Drilling Company, Box 1628, Phone 3-3141, Hobbs, New Mexico.

HELP WANTED

DESIGN OR PROCESS ENGINEER, 30-40, Ch. E or M. E. Cat cracking or fuel handling experience. Conduct studies, design and test on heat balances and combustion, processing bituminous lignite, carbonizing coal. Top salary and opportunity with firm operating in Western States. Write Professional Placement Service, 910 Sixteenth St., Denver 2, Colorado.

MANUFACTURERS' representative wanted to sell production equipment in Gulf Coast area. Generous commission arrangements in protected territory. Must supply complete information, including present lines and references. Box E-923, The Oil and Gas Journal, Tulsa, Okla.

ENGINEER REQUIRED

Graduate Engineer, fully experienced in Oil Refinery Engineering, to handle senior engineering detail of a modernization and expansion project for an Independent Refinery in Western Canada. Permanent position in senior capacity following completion of project. Please give full information, including age, education, experience and salary expected in first letter.

Box E-925

THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

SALES REPRESENTATIVE WANTED

Corporation making quality line deep well pumps, balls and seats and accessories wants hard hitting sales agents in Kansas, Wyoming, Louisiana, West Texas and South Texas. Liberal straight commission deal. Sales handled through major supply company. No objection to handling one or two non-competitive products if a real producer of volume pump sales. Give details oil country experience and other lines handled. President will arrange personal interview each area.

Box E-922

THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

GEOLOGIST

For subsurface work in Saudi Arabia. Degree plus 5 years' experience in well-sitting, and with some knowledge of micro-paleontology. Salary open.

Write giving personal history and work experience. Please include telephone number.

Box E-924

THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

HELP WANTED

WANTED: Refinery instrument repair man. Must be qualified to repair and maintain all types of refinery instrumentation. State age, qualifications and desired salary when applying. Box E-867, The Oil and Gas Journal, Tulsa, Oklahoma.

GRADUATE Mechanical Engineer to Supervise Drilling Crews for the Construction of Large Diameter Water Wells. Call on Municipalities and Industries—To Negotiate Contracts—Must Be Thoroughly Experienced and Capable—Good Salary and Incentive System—Give Past Record—Your Letters Held Confidential. Box E-887, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED— SEISMOGRAPH PARTY CHIEF. Must be fully qualified. Age 27-38. A good opportunity for the right man. Box E-770, The Oil and Gas Journal, Tulsa, Oklahoma.

MAN experienced in accounting methods in refining industry. Must have ability to set up and be in charge of accepted methods and procedures used in refining industry and be qualified to supervise office personnel. Box E-886, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Three Sales representatives for expanding sales organization of nationally known manufacturer of oil field pumping units and production equipment. Territories available in North Texas, Kansas and Oklahoma. Salary plus bonus. Must have oil field experience. Excellent opportunities for right men. Our personnel has knowledge of this ad. All replies answered and confidential. Write stating full qualifications. Box E-893, The Oil and Gas Journal, Tulsa, Oklahoma.

GRAVITY Party Chief, operators and surveyors with experience in South America. Top salary for the right men. Present personnel advised of this ad. Box E-843, The Oil and Gas Journal, Tulsa, Oklahoma.

SEISMIC PERSONNEL needed for United States and Canada by well known and expanding contract geophysical company. Address Box E-863, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Experienced Rotary Drillers for Large Diameter Holes by Large Water Well Drilling Concern Operating in Minnesota. Give References and Full Data in First Letter. Box E-888, The Oil and Gas Journal, Tulsa, Oklahoma.

OIL MATERIALS CLERK for Dallas Office of strong independent. Thorough knowledge of drilling and production equipment necessary as well as some accounting experience. Good salary. Outline experience and personal history in letter to P.O. Box 3043, Dallas, Texas.

CREDIT MANAGER FOR OIL REFINERY. Will handle credits and have supervision of Billing and Collection Department. Excellent opportunity for aggressive married man 30 to 35 years old. Outline experience and personal history in letter to P.O. Box 3043, Dallas, Texas.

ASSISTANT SALES MANAGER for oil country tubular goods with a national manufacturer in territory western half of U. S. Position requires 10 to 15 years' sales experience in similar position or representing oil field supply house. Mid-Continent area preferred. Age 35 to 45. Salary open. Write, giving details of experience and training to Box E-902, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMIST EXPERIENCED in PETROLEUM PROCESSING or PETROLEUM RESEARCH, under 40 years of age for small research and development group. Box E-908, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Experienced Refinery Mechanical Engineer for job in middle sized refinery located in Middle Western State. Please state age, experience, and educational qualifications. Box E-906, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Experienced Refinery Processing Engineer for job in middle sized refinery located in Middle Western State. Please state age, experience, and educational qualifications. Box E-905, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED PETROLEUM ENGINEER under 40 years of age for small research and development group. Box E-907, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

OIL Industry Employment Service, 405 Tuloma Bldg., Tulsa, Okla. 4-5974, Tom Robinson, owner. For technical and trained personnel. Optional with applicant whether he or employer pays our fee.

SITUATIONS WANTED

WORK WANTED! Experienced engineer-geologist, newly launched as independent, desires work on job or retainer basis. No job too big or too small. Specializing in lease and royalty evaluation, exploration and development geology, electric log interpretation and prompt service. Experienced in South Louisiana and surrounding areas. Located in Southwest Louisiana. Box E-897, The Oil and Gas Journal, Tulsa, Okla.

GEOLOGIST: 13 years' foreign work with same major company; responsible positions and varied experience in all phases of exploration work; desires change to administrative position with growing company. Will consider either domestic (prefer Rocky Mt. area or Southwest) or foreign. Box E-896, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMICAL Engineer MS degree University of Oklahoma, 10 years experience in natural gasoline plant operations, process mechanical design and construction, desires responsible position with operating or construction company in natural gas or gasoline field. Box E-890, The Oil and Gas Journal, Tulsa, Oklahoma.

INDEPENDENT GEOLOGIST has Up to Date Well Record File and Subsurface Structural Geological Maps Set Up for Exploration Activity in Oklahoma. Financial Backing Desired for Operation of Company or Partnership Deals. P. O. Box 1884, Tulsa.

SCOUT and Junior Landman, 27 years old, University of Texas, two years experience scouting and land work, free of draft and reserves, mobile, wants land or scouting job. Reply: R. F. Spradlin, care D. G. Dunbar, P. O. Box 568, Corsicana, Texas.

GEOPHYSICIST now employed desires supervisor district geophysicist or comparable duties with aggressive team. Box E-904, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED OIL AND GAS EXECUTIVE, age 39. Petroleum Engineer, University Oklahoma. Broad experience in petroleum engineering, sales, government, construction, gas utilities. Desire change to progressive oil and gas company. Presently employed, Senior Engineer, Gas Transmission Company. Preferable location Houston. Box E-903, The Oil and Gas Journal, Tulsa, Oklahoma.

LANDMAN, now in executive position with Major Company, desires connection with aggressive Independent in Oklahoma, Kansas, or Northwest which offers substantial salary and participation in plays. Eight years experience all phases land activities in Mid-Continent Area. Age 33—L.L.B. degree. Box E-910, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTION SUPERINTENDENT. Graduate Petroleum Engineer. 12 years responsible experience producing industry. Geological ability. Mid-Continent or Rocky Mountains. Box E-774, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED Field Supt. & Petroleum Engineer desires change. Interested in Foreign or Domestic Assignment. Now employed as Management Consultant. J. A. Kelley, 712 Diversey, Chicago 14, Illinois.

YOUNG, married, high school graduate, with one year supply business experience, one year roughnecking experience, desires to make change. Now employed by major supply company. Would consider foreign employment. Box E-918, The Oil and Gas Journal, Tulsa, Oklahoma.

NEW YORK SALES REPRESENTATION FOR SELECTED OIL, CHEMICAL, AND ENGINEERING UNITS — Engineering Sales Manager with 6 years successful New York background has firm, developed contacts at all levels of oil, chemical, and engineering firms in Eastern Seaboard. Can take on a few selected manufacturers who require professional representation. **Box E-912, The Oil and Gas Journal, Tulsa, Oklahoma.**

SITUATIONS WANTED

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No. 1638. Ph. No. 3-3141, Hobbs, New Mexico.

RESERVOIR and Production Engineer, B.S. degree, 3 years experience with major oil company, age 29. Varied experience in reservoir studies, water flood evaluations, work-over recommendations, etc. Interested in foreign or domestic position with major or independent. Box E-919, The Oil and Gas Journal, Tulsa, Oklahoma.

CERTIFIED Public Accountant—Houston Area—Available part or full time. Box E-915, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMICAL Engineer, M.S.Ch.E. Univ. of Michigan, 24 years old, presently employed. Three years diversified experience in Pilot Plants, Process Design and Technical Service. Desires Sales or Field Engineering in Mid-Continent Area. Box E-921, The Oil and Gas Journal, Tulsa, Oklahoma.

LEASE AND DRILLING BLOCKS

WANTED to buy a stripper lease. Box E-917, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR LEASE: 1000 acres near production, want drilling contractor. Write, Alvin Schmidt, Fredonia, Kansas.

FOR SALE: 160 to 20,000 Acres State Oil Leases in Roosevelt, Quay, Hidalgo, Otero and Socorro Counties in New Mexico. Frank Sunseri, 1366 S. Mansfield Ave., Los Angeles, Calif.

BLOCKS in Eastern Kansas. Highly recommended by geologists, also 960 acres shallow production, some undrilled locations. Box 733 Topeka, Kansas.

AM interested in acquiring old or nearly depleted oil properties in Southern Oklahoma and North Texas areas. Give details. R. H. Niccolls, Box 2401, Dallas, Texas.

FOR LEASE: The owners of the land and/or the mineral rights on 75,000 acres in Northeastern Louisiana would like to secure proposals for exploration and development on large or small acreages. One producer on the tract. Box E-864, The Oil and Gas Journal, Tulsa, Oklahoma.

WILL pay cash instantly for leases (large blocks), royalties, mineral deeds, production. Write fully—P. O. Box 2183, Denver, Colorado.

80 ACRE lease redrill. Originally 4 oil wells too far from Fault. 80 acre offset north reworked 2 made 100 bbl. each. ⅛ interest in new well, equipped into tank if producer, $2500.00 cash. L. Price, Coweta, Okla.

FOR SALE: 13,000 acres Wild Cat new 10 year leases, in SE New Mexico. Box E-865, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: 160 to 20,000 Acres State Oil Leases in Roosevelt, Quay, Hidalgo, Otero and Socorro Counties in New Mexico. Frank Sunseri, 1366 S. Mansfield Ave., Los Angeles, Calif.

WILL SELL two structures. First well being drilled now—see it. N. M. Sauls, Cookeville, Tenn.

LEASES ROYALTIES

Producing and Nonproducing

Bought and Sold—Any Area

Inquiries Invited

B. D. BUCKLEY

6635 Delmar Ave., St. Louis 5, Mo.

BUSINESS OPPORTUNITIES

ARMAND TEDESCHI, Geophysical Surveys, Calif. only, Gas & Oil structures, Calistoga, Calif. Services guaranteed.

EXPERIENCED, established Geologist has farm outs, drilling deals, royalties and minerals in West Texas. Box E-913, The Oil and Gas Journal, Tulsa, Oklahoma.

BUSINESS OPPORTUNITIES

EQUIPMENT DEALERS

Well known diesel engine manufacturer is seeking active dealer representation in North and South Dakota, Wyoming and Montana. Excellent opportunity for an aggressive dealer organization with good knowledge of power application problems for drilling and gathering line pumping. **Box E-899, The Oil and Gas Journal, Tulsa, Oklahoma.**

ROYALTIES

WILLISTON BASIN ROYALTIES

Dealers in Montana royalties since 1921, we now specialize in royalties under major company leases in the Montana portion of the Williston Basin. For information on our method of operation, write LANDOWNERS ROYALTIES COMPANY, Box 1225, Great Falls, Montana.

JACK EAGLE—Pay you immediately for your producing royalties and Overrides, absolutely no delay, send complete details, 706 City Nat'l Bldg., Okla. City, Okla. REgent 6-7027.

GET TOGETHER: Both Capital and Royalties are available. If the investment proposition you want isn't listed in this column, use a Journal classified advertisement to find it. See box heading for classified rates, or write The Oil and Gas Journal.

PRODUCTION

We Will Buy

PRODUCING landowners royalty and producing leases. Any amount, any area. Confidential information required and furnished. A 1 Bank Reference.

COMBEST ROYALTY COMPANY

825-826 Amarillo Bldg.

Amarillo, Texas

LEGAL

NOTICE is hereby given that sealed bids for this sale of oil and gas leases on 21,605 acres of allotted Indian and Tribal lands in Valley, Roosevelt and Sheridan counties, Montana, will be received in the Office of the Superintendent, Fort Peck Indian Agency, Poplar, Montana, until 2:00 P.M. Mountain Standard Time, August 19, 1952. The sealed bids will then be opened and the high bids announced, after which the leases will immediately be offered at public auction. The sealed bids will remain effective unless higher satisfactory bids are received at the auction. Further notice is given that sealed bids will be received until 2:00 P.M. Mountain Standard Time, August 21, 1952, and the same procedure as outlined above will be followed for the sale of an oil and gas lease covering 160 acres of land in Sec. 20, Twp. 28N, R52E, MM Roosevelt County, Montana. Full particulars may be obtained by contacting Superintendent James D. Crawford, Fort Peck Indian Agency, Poplar, Montana.

LEGAL

337.67 ACRES of restricted Allotted Indian lands located within the jurisdiction of the Uintah and Ouray Indian Reservation, in Uintah County, State of Utah, in Township 12 South, Range 21 East, Salt Lake Base Meridian, are being advertised for oil and gas lease, bids on which will be opened August 28, 1952, at 2:00 P.M., at the office of Harry W. Gilmore, Superintendent, Uintah and Ouray Agency, Fort Duchesne, Utah. Full particulars may be obtained from the office of the Regional Oil and Gas Supervisor, U. S. Geological Survey, Casper, Wyoming, or from the Uintah and Ouray Agency.

LEGAL

1351.18 acres of allotted Indian lands, located in Township 36 North, Range 37 West; Township 37 North, Range 37 West; and Township 37 North, Range 38 West, 6th P. M., South Dakota, in the Pine Ridge Reservation, are being advertised for oil and gas leasing, bids on which will be opened **August 28, 1952, at 2:00 P. M.**, Mountain Standard Time, at the Office of the Superintendent of the Pine Ridge Indian Agency, Pine Ridge, South Dakota. Full descriptions and copies of the advertisement may be obtained from the Superintendent, Pine Ridge Indian Agency, Pine Ridge, South Dakota, or from the Oil and Gas Supervisor, U. S. Geological Survey, Federal Building, Casper, Wyoming.

Oklahoma Fields

(Continued from page 201)

development a mile east of Edmond and south of the Northeast Edmond field, Oklahoma County. Its 1 Junker, C NW SE 31-14n-2w, flowed 288 bbl. of oil in 24 hours through 11/64-in. choke from Bartlesville sand, topped at 5,964 ft. and open below 5,965 ft to 5,980 ft. (total depth). It flowed 984 bbl. of oil in 24 hours through ½-in. choke. The company's 1 Kelly-Thompson, C SW NE 31, flowed 750 bbl. of oil through ½-in. choke from the same pay. Pinched to ⅛-in. choke, it flowed 100 bbl. in 24 hours. Two additional locations have been made in the same section.

OKLAHOMA SUCCESSFUL WILDCATS

Garvin County: Phillips Petroleum Co. 1 Barb, C NE SW 18-3n-3w, flowed 163 bbl. of oil from Hart 8,590-8,626 ft., 88 bbl. from Springer 9,363-9,249 ft., TD 9,600 ft.

Kay County: Helmerich & Payne, Inc., 1 Seltzer, NW NE NE 15-28n-3e, flowed 6 bbl. of oil from Bartlesville 3,090-3,101 ft., TD 3,101 ft. (extends North Mervine pool).

Osage County: George Pease, Jr. 1 Osage, NE NE NW 6-24n-7e, pumped 25 bbl. of oil from Burbank 2,623-83 ft., TD 2,683 ft.

OKLAHOMA WILDCAT FAILURES

Beaver County: Carter Oil Co. 1 Grove, C NW NE 6-5n-22ecm, dry, TD 6,662 ft. Kidd Williams 1 Deck, C NW NW 31-5n-21ecm, dry, TD 6,950 ft.

Beckham County: Ryan Oil Co. 1 Gordon, NW SE 20-10n-26w, dry, TD 10,715 ft.

Cleveland County: V. A. Brill and Herman Brown 1 Graves, NE NE SW 24-9n-2w, dry, TD 7,567 ft.

Cotton County: J. T. West and John Kerr 1 Thomas, NE NE SE SE 12-2s-13w, dry, TD 2,101 ft.

Creek County: D&L Oil Co. 1 Mills, NE NW NW 23-15n-9e, dry, TD 3,635 ft. D&L Oil Co. 1 Hinton, SE SE SE 22-19n-8e, dry, TD 2,556 ft.

Jackson County: Stanolind Oil & Gas Co. 1 Murray "A," SE SE SE SE 33-2n-22w, dry, TD 8,003 ft.

Jefferson County: C. V. Richardson 1 Boggs, NE NW SE 23-3e-4w, dry, TD 3,939 ft.

Lincoln County: Falcon-Seaboard 2 Gragg, SW SW NE 23-12n-6e, dry, TD 4,708 ft. Herndon Drilling Co. 1 Terry, NE NE NW 31-16n-6e, dry, TD 4,213 ft.

Logan County: T. T. Eason 1 Jones, NE NW NW 13-15n-3w, dry, TD 6,348 ft. Peppers Refining Co. 1 Denny, NE NE SW 32-16n-3w, dry, TD 6,392 ft.

Noble County: A. G. Oliphant 2 Eaton "A," NE NE NE 8-24n-3e, dry, TD 2,974 ft.

Payne County: Fred P. Schonewald Oil 1 Porter, NW NW SE 12-17n-2e, dry, TD 4,365 ft.

Tillman County: Carter Oil Co. 1 Minton, SW SW NW 18-2s-14w, dry, TD 3,321 ft.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that the SE¼SE¼ sec. 4, T. 20 N., R. 3 W., Mich. M., Michigan, 40 acres, within the known geologic structure of the Headquarters field, will be offered for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre, at 1 p. m., Eastern Standard Time, September 10, 1952, when bids will be opened. Details of the lease offering and how and where to file bids may be obtained by addressing an inquiry to this office. Marion Clawson, Director.

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NATIONAL SOLVES ANOTHER PROBLEM

CONDITIONS

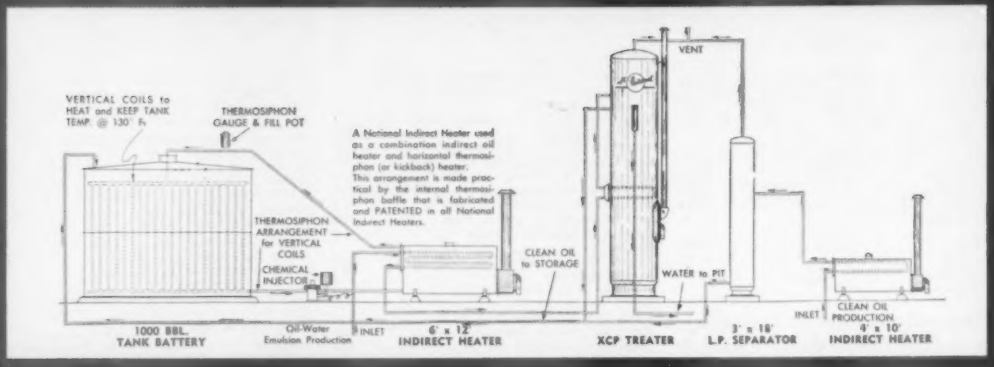
18° API Gravity, Asphalt Base Foaming Oil Production
One Well Producing no emulsion
One Well Producing 20% cut emulsion
Low GOR, Approx. 200 to 1
High Temperature pour point crude

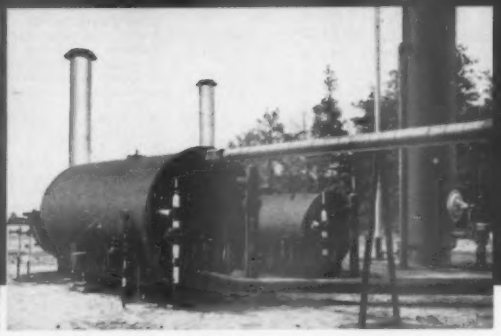
REQUIREMENTS

De-gas Crude
Reduce Emulsion
Maintain storage temp. at approx. 130° so pipeline can pump oil out of storage.

SOLUTION

Use 4 x 10 Ind. Heater to preheat clean production for degassing.
Use 3 x 18 Separator to degas clean crude.
Use 6 x 12 Ind. Heater to preheat emulsion, AND to provide heat to the thermosiphon vertical coil system in storage tank.
Use XCP Treater to de-gas emulsion and dewater the crude.


VERTICAL COILS to HEAT and KEEP TANK TEMP. @ 130° F.
THERMOSIPHON GAUGE & FILL POT
A National Indirect Heater used as a combination indirect oil heater and horizontal thermosiphon (or kickback) heater. This arrangement is made practical by the internal thermosiphon baffle that is fabricated and PATENTED in all National Indirect Heaters.
THERMOSIPHON ARRANGEMENT for VERTICAL COILS
CHEMICAL INJECTOR
CLEAN OIL to STORAGE
VENT
WATER to PIT
INLET
CLEAN OIL PRODUCTION
1000 BBL. TANK BATTERY
Oil-Water Emulsion Production
INLET
6' x 12' INDIRECT HEATER
XCP TREATER
3' x 18' L.P. SEPARATOR
4' x 10' INDIRECT HEATER



Good production is preheated in the small indirect heater then flows directly into insulated separator for degassing after heating. Emulsion crude flows through large indirect heater for preheating and chemical application then into preheating coil of National XCP Treater.

Unique in this hook-up is the method used to maintain 130 degrees temperature on the storage tanks. Each of the storage tanks contains a set of vertical coils that are used as heat exchangers. Hot water flows through these coils. The water is circulated thermosiphonically between the water bath of the large indirect heater and the coils in the tanks.

This entire arrangement is so complete that it requires very little of the pumper's time, thus, releasing him to other lease duties in addition to this lease. The treating problem on this lease represented a most difficult situation because the production was foaming and because the emulsion produced from these foaming wells was finely cut and because the viscosity of the oil was very high and because the storage tanks had to be maintained at such a high temperature.

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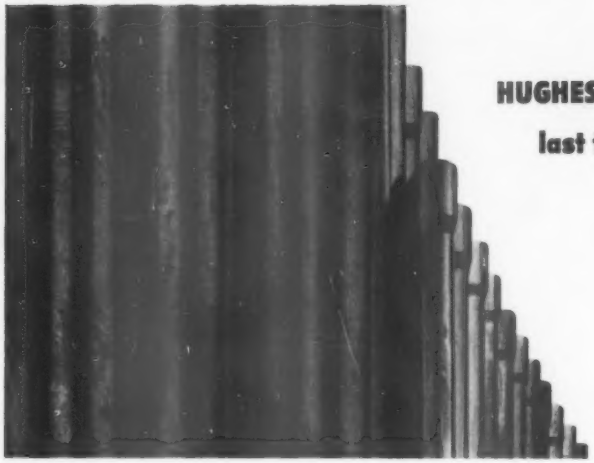

HUGHES Flash-Weld tool joints
last the life of your drill stem...

JOHN C CASSER
EDITORIAL DEPT

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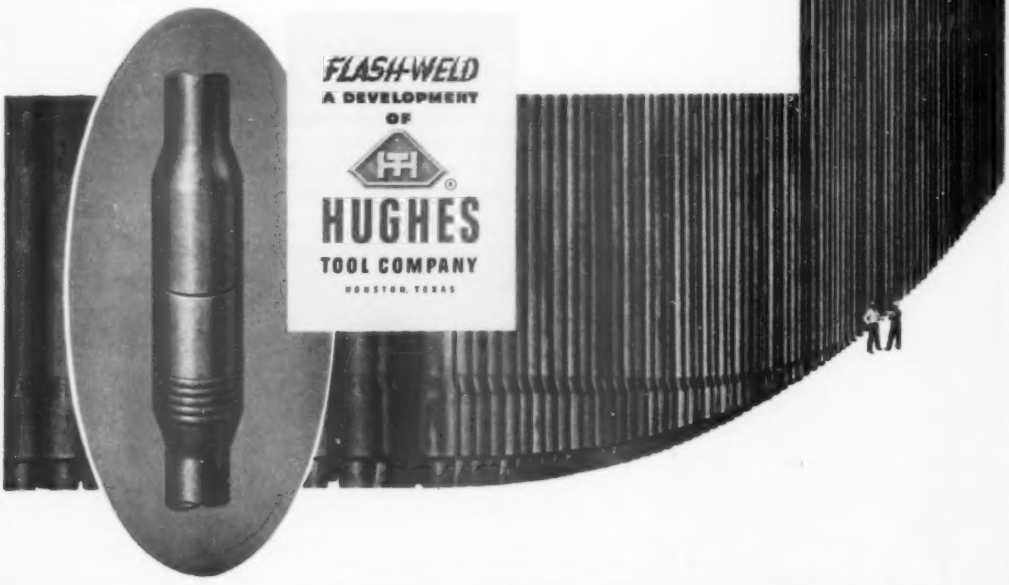

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